

232 Collaborative Suppor 2009 - 11:29:18 am

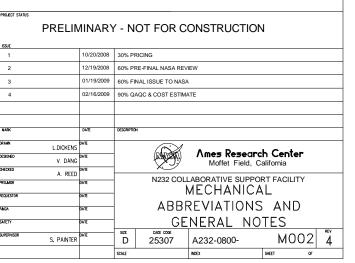
ABBREVIATIONS GENERAL NOTES

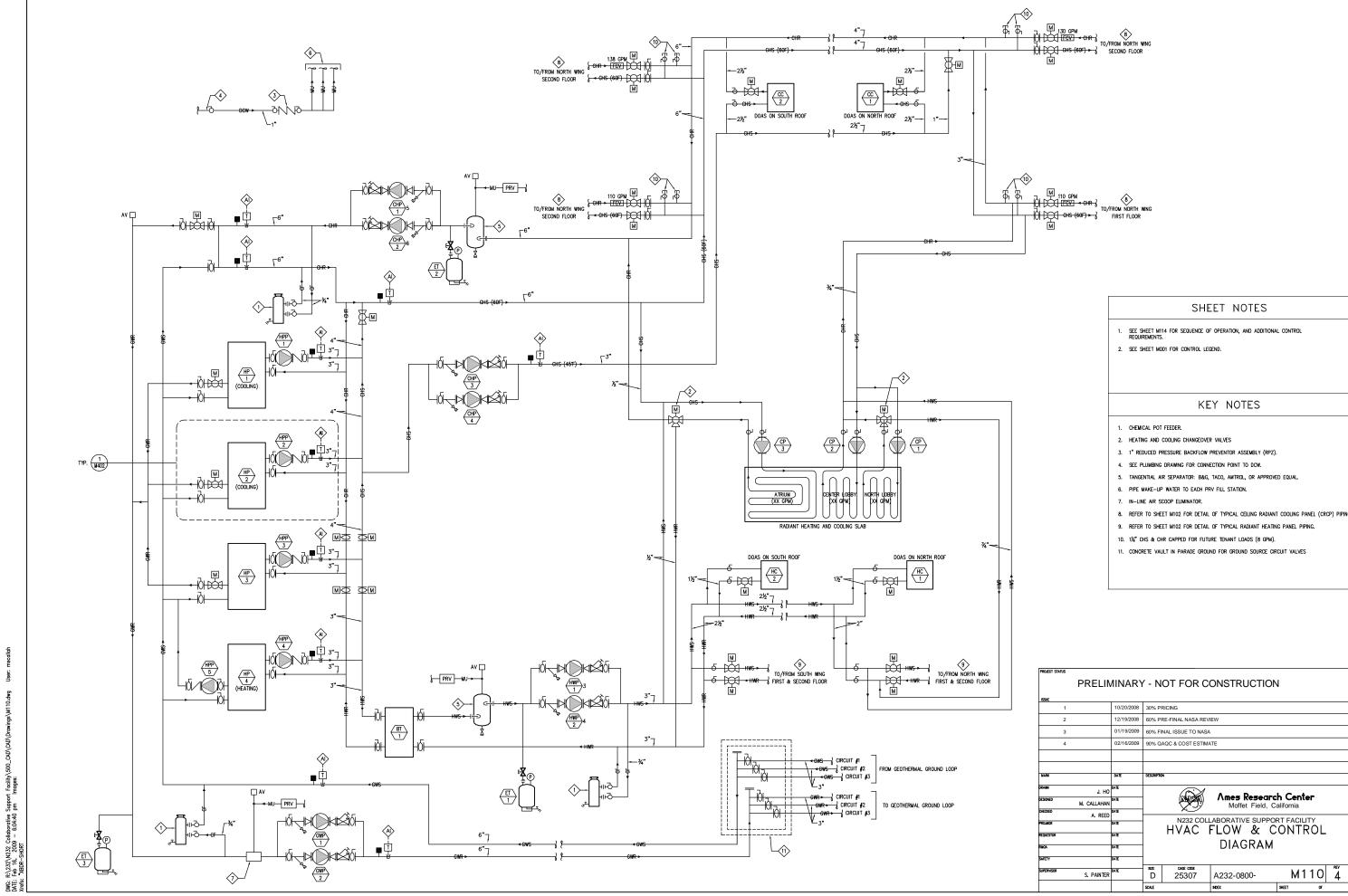
0	AT	*F	DEGREES FAHRENHEIT	L	LENGTH	SECT	SECTION
&	AND	FA	FROM ABOVE	LAT	LEAVING AIR TEMPERATURE	SEER	SEASONAL ENERGY EFFICIENCY
ACU	AIR CONDITIONING UNIT	FACP	FIRE ALARM CONTROL PANEL	LB	POUND	SF	SUPPLY FAN
ACCU	AIR COOLED CONDENSING UNIT	FB	FROM BELOW	LDB	LEAVING DRY BULB TEMPERATURE	SG	SPECIFIC GRAVITY
AD	ACCESS DOOR	FC	FORWARD CURVED FAN WHEEL	LDP	LEAVING DEW POINT TEMPERATURE	SHT	SHEET
AF	AIRFOIL FAN WHEEL	FD	FIRE DAMPER	LF	LINEAR FEET	SMS	SHEET METAL SCREW
AFF	ABOVE FINISH FLOOR	FIN	FINISHED	LRA	LOCKED ROTOR AMPERES	SDV	SHUT OFF VALVE
AMP	AMPERE	FLEX	FLEXIBLE	LVG	LEAVING	SP	STATIC PRESSURE
APD	AIR PRESSURE DROP ("WG)	FLA	FULL LOAD AMPERE	LWB		SPECS	SPECIFICATIONS
APPROX	APPROXIMATE	FLR	FLOOR		LEAVING WET BULB TEMPERATURE		
ARCH	ARCHITECTURAL	FPM	FEET PER MINUTE	LWT	LEAVING WATER TEMPERATURE	SO	SQUARE
		FMCS				SQ FT	SQUARE FEET
AS	AIR SEPARATOR	FMCS	FACILITY MANAGEMENT			SS	STAINLESS STEEL
ASCS	AMES STANDARD CONSTRUCTION		CONTROL CENTER	MAU	MAKE-UP AIR UNIT	STD	STANDARD
	SPECIFICATION			MAX	MAXIMUM	STRUCT	STRUCTURAL
AUTO	AUTOMATIC			MCA	MINIMUM CIRCUIT AMPACITY	SW	SWITCH
AX	AXIAL FAN	FSD	FIRE SMOKE DAMPER	MCC	MOTOR CONTROL CENTER		oo.ii
AVA	AIR VENT (AUTOMATIC)	FS	FLOOR SINK		MOTORIZED DAMPER		
AVM	AIR VENT (MANUAL)	FSP	FAN STATIC PRESSURE	MD		_	
VAIM.	AIR VENT (MANGAL)	FT	FEET, FOOT	MECH	MECHANICAL	T	THERMOSTAT
			FEET WATER GAUGE	MER	MECHANICAL EQUIPMENT ROOM	TEC	TERMINAL EQUIPMENT CONTROL
		FV FV	FACE VELOCITY	MIN	MINIMUM	TEFC	TOTALLY ENCLOSED FAN COOLE
BFP	BACKFLOW PREVENTER ASSEMBLY			MISC	MISCELLANEOUS	TCC	TOTAL COOLING CAPACITY
BFV	BUTTERFLY VALVE	FW	FEED WATER	MOCP	MAXIMUM OVERCURRENT PROTECTION	THC	TOTAL HEATING CAPACITY
BHP	BRAKE HORSEPOWER			MOV	MOTOR OPERATED VALVE, AUTOMATIC	TDH	TOTAL DYNAMIC HEAD
BI	BACKWARD INCLINED FAN WHEEL						
BLDG	BUILDING	G	(NATURAL) GAS	MTD	MOUNTED	TEMP	TEMPERATURE
		GA	GAUGE	MTG	MOUNTING	THC	TOTAL HEATING CAPACITY
BOD	BOTTOM OF DUCT	GAL	GALLON	MU	MAKE-UP WATER	THRU	THROUGH
B0P	BOTTOM OF PIPE	GALV	GALVANIZED			TOS	TOP OF STEEL
BPD	BY-PASS ZONE DAMPER	GC	GENERAL CONTRACTOR			TSP	TOTAL STATIC PRSSURE
BTUH	BRITISH THERMAL UNITS PER HOUR	GFE		N/A	NOT APPLICABLE	TYP	TYPICAL, UNLESS OTHERWISE N
			GOVERNMENT FURNISHED EQUIPMENT			1115	IONE, ONCESS VITERIANSE I
		GPM	GALLONS PER MINUTE	NC	NORMALLY CLOSED / NOISE CRITERIA		
CD	CONDENSATE DRAIN	GSM	GALVANIZED SHEET METAL	NO.	NORMALLY OPEN		
		GV	GRAVITY VENTILATOR	NIC	NOT IN CONTRACT	UFAD	UNDERFLOOR AIR DISTRIBUTION
CFF	CAP FOR FUTURE CONNECTION	GWR	GEOTHERMAL WATER RETURN	NPSHR	NET POSITIVE SUCTION HEAD REQUIRED	UL	UNDERWRITER LABORATORIES
CFM	CUBIC FEET PER MINUTE	GWS	GEOTHERMAL WATER SUPPLY	NTS	NOT TO SCALE	UON	UNLESS OTHERWISE NOTED
CHR	CHILLED WATER RETURN					UTR	UP THROUGH ROOF
CHS	CHILLED WATER SUPPLY					U/C	UNDERCUT
CONC	CONCRETE	н	HEIGHT	ann	ODDOCED DIADE DAMPED	0/0	ONDERGOT
COND	CONDENSATE			OBD	OPPOSED BLADE DAMPER		
		HG	REFRIGERANT HOT GAS	ODC	OZONE DEPLETING COMPOUND		
CONN	CONNECTION	HORIZ	HORIZONTAL	OPER	OPERATING	V	VOLT/VENT
CONT	CONTINUATION	HP	HORSEPOWER	OSA	OUTSIDE AIR	VB	VACUUM BREAKER
COP	COEFFICIENT OF PERFORMANCE	HR	HOUR	OV	OUTLET VELOCITY	VAC	VACUUM
COTR	CONTRACTING OFFICER'S	HSPF	HEATING SEASONAL PERFORMANCE FACTOR			VAV	VARIABLE AIR VOLUME
	TECHNICAL REPRESENTATIVE					VD	MANUAL VOLUME DAMPER
CP	CONDENSATE PUMP	HVAC	HEATING, VENTILATING AND AIR CONDITIONING	DOE	DOUBLE DED CUDIO FEET	VERT	VERTICAL VOLUME DAMPER
CPF	CHEMICAL POT FEEDER	HW	HOT WATER	PCF	POUNDS PER CUBIC FEET		
CRCP		HWR	HEATING WATER RETURN	PD	PRESSURE DROP	VFD	VARIABLE FREQUENCY DRIVE
UNUP	CEILING RADIANT CEILING PANEL	HWS	HEATING WATER SUPPLY	POC	POINT OF CONNECTION	VTR	VENT THROUGH ROOF
				PDD	POINT OF DISCONNECTION	VAV	VARIABLE AIR VOLUME
		HZ	HERTZ	PDS	POSITIVE		
DB	DRY BULB			PRESS	PRESSURE	w	WATT, WIDTH
DCW	DOMESCTIC COLD WATER			PRV	PRESSURE REDUCING VALVE	w/	WITH
DDC	DIRECT DIGITAL CONTROL	ID	INSIDE DIAMETER				
DEFL	DEFLECTION	IFS	IN FURRED SPACE	PSI	POUNDS PER SQUARE INCH	WB	WET BULB
		IN	INCH, INCHES	PSIA	POUNDS PER SQUARE INCH ABSOLUTE	WG	WATER GAUGE PRESSURE
DET	DETAIL		INCHES WATER GAUGE	PSIG	POUNDS PER SQUARE INCH GAUGE	WGT	WEIGHT
DIA	DIAMETER	110, 110		PTT	PRESSURE & TEMPERATURE TEST PORT	WP	WEATHER PROOF
DN	DOWN					WPD	WATER PRESSURE DROP ('WG)
D9B/S	DENDICASINO KOUDONECTAOR SYSTEM	VEE	MITCHEN EVILLIET CAN			WMS	WIRE MESH SCREEN
DWG	DRAWING	KEF	KITCHEN EXHAUST FAN	QTY	QUANTITY		mean someth
DX	DIRECT EXPANSION	KW	KILOWATT	VII	VOANTITI		
un	DINEOT EXPANSION	KWH	KILOWATT-HOUR				
(m)				RA	RELIEF AIR		
(E)	EXISTING			REF	REFERENCE		
EA	EACH			REQD	REQUIRED		
EAT	ENTERING AIR TEMPERATURE			REV	REVISION, REVISE		
EDB	ENTERING DRY BULB TEMPERATURE						
EF	EXHAUST FAN			RH	RELATIVE HUMIDITY		
				RL	REFRIGERANT LIQUID		
EFF	EFFICIENCY			RLA	RUNNING LOAD AMPS		
EL	ELEVATION			RM	ROOM		
ELEC	ELECTRICAL			RRV			
	ENTERING				REFRIGERANT RELIEF VENT		
	EQUIPMENT			RPM	REVOLUTIONS PER MINUTE		
ENT				RTU	ROOF TOP UNIT		
EQUIP							
EQUIP ESP	EXTERNAL STATIC PRESSURE			RS	REFRIGERANT SUCTION		
EQUIP ESP ET	EXPANSION TANK			RS	REFRIGERANT SUCTION		
EQUIP ESP				RS	REFRIGERANT SUCTION		

- THE DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED PROJECT. UNLESS OTHERWISE NOTED, THEY DO NOT INDICATE THE WETHOO OF CONSTRUCTION. CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES AND PROCEDURES IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES. DESIGN, INSTALL, AND ASSURE ADEQUACY AND SAFETY OF TEMPORARAY BRACING AND SUPPORTS.
- PREPARATION: BEFORE PERFORMING MECHANICAL WORK, BECOME FULLY ACQUAINTED WITH JOB CONDITIONS AFFECTING INSTALLATION WORK COVERED BY THE DRAWINGS AND SPECIFICATIONS.
- SAFETY: CONTRACTOR IS RESPONSIBLE FOR SAFETY OF WORK AREA DURING ENTIRE CONSTRUCTION PERIOD. PROTECT ADJACENT PROPERTIES AND UTILITIES IN ACCORDANCE WITH ALL NATIONAL, STATE AND LOCAL SAFETY CORDINANCES.
- 4. REFRIGERANTS: USE OF NON-OZONE DEPLETING COMPOUNDS IS MANDATORY.
- SCHEDULE: SUBMIT WORK SEQUENCE SCHEDULE FOR APPROVAL BY COTR. DO NOT OPERATE ANY UTILITIES WITHOUT PRIOR PERMISSION FROM COTR. THIS INCLUDES, BUT IS NOT LIMITED TO, OPENING & CLOSING VALVES & SWITCHES, ETC. FOR DOMESTIC WATER, FIRE SPRINKLER SYSTEMS, ETC.
- SUBMIT PRODUCT DATA TO COTR FOR APPROVAL OF ITEMS LISTED IN MECHANICAL EQUIPMENT LIST. OBTAIN ENGINEER'S APPROVAL PRIOR TO PURCHASE OR INSTALLATION.
- COORDINATION: COORDINATE WORK AND INSTALLATION BETWEEN ALL TRADES AND WORKMEN. COORDINATE ELECTRICAL POWER SOURCES AND REQUIREMENTS FOR MECHANICAL EQUIPMENT AND MOTORIZED DEVICES, INCLUDING COMBINATION FRE & SWOKE DAMPERS, AND CONTROL DAMPERS.
- CODES: INSTALL MECHANICAL SYSTEMS PER CURRENT CALIFORNIA BUILDING CODES, INCLUDING CMC, CFC AND CPC. CONSTRUCT, INSULATE, SUPPORT, BRACE, AND SEAL PER CHAPTER 6 OF CMC.
- EQUIPMENT INSTALLATION: INSTALL PER MANUFACTURER'S RECOMMENDATIONS AND WRITTEN INSTRUCTIONS, AND IN ACCORDANCE WITH LISTING REQUIREMENTS. SUPPORT AND ANCHOR ALL EQUIPMENT. PROVIDE MINIMUM SERVICE OLEARANCES. INSTALL PIPE REQUEERS AND DUCT IRANSTIONS WHERE REQUIRED FOR FINAL CONNECTION TO EQUIPMENT.
- EQUIPMENT PADS: PROVIDE REINFORCED CONCRETE EQUIPMENT HOUSEKEEPING PAD PER SHEET SOO6 FOR ALL BASE MOUNTED EQUIPMENT, UON. FORM 1" CHAMFER ON ALL TOP EDGES. MINIMUM PAD HEIGHT IS 4" AFF, UON.
- 10. SUPPLEMENTAL SIEEL: ATTACH ANCHORS, SUPPORTS AND BRACING FOR EDUPMENT, DUCTS AND PIPES DRECHLY TO CONCRETE OR STRUCTURAL STEEL ONLY. DO NOT ATTACH TO ROOF DECK. PROVIDE SUPPLEMENTAL STRUCTURAL STEEL WHERE UPPER PROFER ATTACHMENT CONNOT BE MADE DIRECTLY TO BUILDING STRUCTURAL FRAMING. SUPPLEMENTAL STRUCTURAL STEEL AND CONNECTIONS SHALL BE AS SPECIFIED FOR BUILDING FRAMING. SUBMIT DESIGN OF SUPPLEMENTAL STRUCTURAL AND APPLIED TORCES TO COTR FOR APPROVAL.
- BASIS OF DESIGN: EQUIPMENT LOCATION, AND SERVICE ACCESS CLEARANCE INDICATED ON PLANS BASIS OF DESIGN: ELOUMENT LOCATION, AND SERVICE ACCESS CLEARWISE INCLUDED WE PLANS WERE SELECTED AS ENGINEERED BASIS OF DESIGN. ACTUAL SPACE RECOVERMENTS MAY VARY-FROM DESIGN DEPENDING ON PURCHASED EQUIPMENT. IF APPROVED ELOUPMENT TO BE INSTALLED FUNCTIONAL FOR PROVIDE ALL ADJUSTMENTS REQUIRED FOR A FULLY FUNCTIONAL SYSTEM, AND COORDINATE ALL CONNECTING SERVICES WITHOUT ADDITIONAL COST TO GOVERNMENT.
- DIMENSONS: DO NOT SCALE DRAWINGS. ALL DIMENSIONS SHALL HAVE PRECEDENCE OVER SCALE. SITE CONDITIONS SHALL PREVAIL DIMENSIONS DIDICATED ARE FOR PRICING PURPOSES ONLY. FIELD VERIFY ALL DIMENSIONS TO ENSURE PRECISE FIT.
- 11. PIPING INSTALLATION: ALL VALVES AND PIPING SYSTEDM SPECIALTIES SHALL BE FULL-LINE SIZE, PHPMO INSTRUCTIONS: ALL VALVES AND PHPMO STORM STEEDRILES SYNTLE BE FOULT—UNE SIZE, UON, PROVIDE CHAIN DEPERATOR FOR VALVES INSTITUTE OF THE TOTAL THE CONTROL OF THE STEED STATE OF THE STATE ALL HARZONTAL REDUCTIONS IN PIPE SIZE SHALL MADE ECCENTRIC REDUCERS WITH 10°F SIDE FLAT. INSTALL VENTS AT ALL HIGH PROMIS, AND DRAINS AT ALL LOW POINTS OF PHPMS. DO NOT INSTALL WATER PHPMS ABOVE ELECTRICAL EQUIPMENT. SUPPORT ALL SUSPENDED PIPES INSIDE MECHANICAL ROOM WITH SPRING HANGER ISOLATORS.
- 12. PIPE INSULATION: INSTALL INSULATION INSERT AND INSULATION SHIELD AT ALL INSULATED PIPE SUPPORTS. INSULATE PIPING WITH THOONESS AS LISTED BELOW: OHING & CHIWR: 1" HING & HIWR: 1"

- 13. REFRIGERANT FIELD PIPMG.
 TUBING: COPPER TYPE K, ASTM B 280, HARD DRAWN, ACR GRADE FACTORY CLEANED
 REFRIGERANT PIPMG, SLOPE ALL TUBING 3F PER 10 FEET IN DIRECTION OF FLOW.
 JOINTS: BRAZED, TYPE BEAD-5 FLIER METAL, RITRIGOSEN PURGE
 SUPPORTS: CONFORM 10 MSS SP-58 AND MSS SP-59. PROVIDE VIBRATION ABSORBING
 NEOPRENE CUSHON AT SUPPORTS.
 FITTINGS: WROUGHT COPPER OR BRONZE FOR BRAZED JOINTS, ASME B16.22.
 INSULATION SYSTEM: ASSC TYPE T-3, CELLULAR ELASTOMERIC, ASTM C 534, GRADE 1, TYPE 1,
 3F THICK. DO NOT INSULATE RI. TUBING.
 VALVES. IESTED FOR REFRIGERANT SERVICE, BRAZED CONNECTIONS, FULL-PORT BALL VALVE
 FOR REFRIGERANT STOPS.
- 13. FIRESTOP ALL PIPE PENETRATIONS THROUGH FIRE RATED WALLS OR FLOORS USING UL LISTED FIRESTOP ASSEMBLY.
- 14. SEISMIC BRACING: SUPPORT AND BRACE ALL PIPING AND DUCTWORK PER SMACNA "SEISMIC RESTRAINT MANUAL GUIDELINES FOR MECHANICAL SYSTEMS", LATEST EDITION. DESIGN TO SEISMIC HAZARD LEVEL A.
- 15. DUCTWORK: CONSTRUCT ALL DUCTWORK TO SMACNA PRESSURE CLASS 1" WG, AND SMACNA SEAL CLASS "B", UON. INSTALL DOUBLE THICKNESS TURNING VANES IN ALL 90" MITERED DUCT ELBOWS, UON. MAXIMUM ALLOWABLE FLEXIBLE DUCT LENGTH IS 5'-0". INSTALL HIGH EFFICIENCY TAKE-OFFS DOWNSTREAM OF FAN. DUCT SIZES ARE IN INCHES, AND INDICATE INDICATE CLEAR INSIDE DIMENSION OF AIR PATH. RECTANGULAR DUCT FIRST DIMENSION IS SIDE VIEWED, SECOND DIMENSION IS FAR PROPERTIONAL OF TOWNSTREAM OF THE PROPERTIONAL OF THE PATH.
- 16. DUCTWORK AND PIPE ROUTING SHOWN ON DRAWINGS IS DIAGRAMMATIC, AND IS NOT TO BE SCALED. PROVIDE ALTERNATE ROUTING, OFFSETS AND TRANSITIONS WHERE REQUIRED FOR COMPLETION OF WORK, AT NO ADDITIONAL COST TO GOVERNMENT.
- 17. DUCT INSULATION: INSULATE ALL SUPPLY DUCTS. INSULATE RELIEF DUCTS ABOVE ROOF. PROOVED ACQUISTE DUCT LINER IN SUPPLY AND RELIEF DUCTS ABOVE ROOF. INSULATION AND DUCT LINER THICKNESS SHALL BE 1" MINNIUM, UON.
- ACCESS: INSTALL SERVICE ACCESS PANEL OR DOOR FOR EQUIPMENT INSTALLED IN INACCESSIBLE WALLS OR CELIMOS, INCLUDING, BUT NOT LIMITED TO, DAMPERS, VALVES, FLOW METERS, TRAP PRIMERS. COORDINATE LOCATION WITH GENERAL CONTRACTOR.

- 19. CONTROLS: CONTROL DIAGRAMS ARE SCHEMATIC REPRESENTATIONS ONLY. PROVIDE ALL ADDITIONAL CONTROL ITEMS NECESSARY TO MEET THE FUNCTIONAL REQUIREMENTS OF THE SEQUENCE OF OPERATIONS, AND SPECIOFACIONS. PROVIDE COMPLETE SYSTEM WHICH IS FUNCTIONAL IN ALL RESPECTS. TEST FOR COMPORMANCE TO THE PERFORMANCE REQUIREMENTS. COMMISSION INTO OPERATION, AND CALIBRATE UNDER OPERATING CONDITIONS. MOUNT ROOM TEMPERATURE SENSORS AT 44 NOHES ABOVE FINISHED FLOOR, UON.
- 20. BALANCING DAMPERS: INSTALL DAMPER IN EACH BRANCH DUCT CONNECTED TO AN AIR OUTLET OR INLET, WHETHER SHOWN ON PLAN OR NOT. INSTALL BALANCING DAMPER AT MAXIMUM DISTANCE FROM AIR OUTLET OR INLET. PROVIDE CONCEALED REGULATOR FOR MANUAL VOLUME DAMPERS INSTALLED IN GYPSUM BOARD CEILINGS.
- 21. TEST AND BALANCE: BALANCE AIR SUPPLY, RETURN AND EXHAUST SYSTEMS TO AIR FLOW OUNNINES SHOWN ON PLAN. BALANCE AIR CULTETS AND INLETS TO +5% TO -5% TOLERANCE. BALANCE AIR DELIVERY CULTIPLET AND TO -5% TOLERANCE. BALANCE HYDRONIC CIRCUITS TO WATER FLOW QUANTITIES SHOWN ON PLAN. SUBMIT CERTIFIED AIR AND WATER BALANCE REPORT AND OUTSIDE AIR CERTIFICATION TO COTT & ENGINEER FOR REVIEW PRIOR TO PROJECT CLOSCUIT AND OCCUPANCY. IEST AND BALANCE AGENCY SHALL BE CERTIFIED BY ABBC OR NEED, OR
- 22. RECORD DRAWINGS: SUBMIT AS-BUILT DRAWINGS OF ALL MECHANICAL AND PLUMBING SYSTEMS PRIOR TO JOB COMPLETION AND PROJECT CLOSEOUT
- 23. NOT ALL SYMBOLS AND ABBREVIATIONS LISTED ON SHEET MOOT AND MOOZ ARE USED.
- APPROVED MANUFACTURERS: MANUFACTURERS NAMED ON DRAWINGS REFER TO AL MANUFACTURERS FOR SIMILAR PRODUCTS AS LISTED BELOW. PRODUCT MUST BE EX MATERIAL, DIMENSIONS, FUNCTION AND APPLICATION AS THE NAMED PRODUCT. PRODUCT MUST BE EQUIVALENT IN
 - METAL FRAMING CHANNEL, PIPE GUIDES, PIPE CLAMPS: COOPER B-LINE, UNISTRUT, POWERSTRUT, OR EQUAL. "B-LINE" REFERS TO COOPER B-LINE.





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DIAGRAM NOTE:
1. CONNECT CONTROL POINT TO NEAREST DDC ZONE CONTROLLER.

5 COMM & TEL/DATA ROOM COOLING

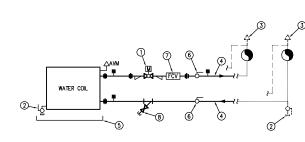


DIAGRAM NOTES:

1. CONTROL VALVE REFER TO AHU SCHEDULE FOR SIZE.
2. CAPPED DRAIN VALVE WITH HOSE ADAPTOR REQUIRED AT ALL LOW POINTS FOR DRAINAGE
3. AIR VENT REQUIRED WHEN TAPPED INTO TOP OF MAINS.
4. COLL BRANCH PIPE REFER TO AHU SCHEDULE FOR SIZE.
5. STANLESS STEEL CONDENSATE DRAIN PAN FOR COOLING COLLS ONLY. SEE PIPING DETAIL FOR TRAP ASSEMBLY.
6. LINE SIZE SHUT-OFF SERVICE VALVE
7. FLOW CONTROL VALVE FOR FLOW HUMITING. REFER TO AHU SCHEDULE FOR DESIGN GPM
8. LINE SIZE STRAINER WITH CAPPED HOSE ADAPTOR ON BLOWDOWN VALVE.

DISCRETE PIPING COMPONENTS MAY BE COMBINED IN AVAILABLE KITS.

4 HYDRONIC COIL PIPING

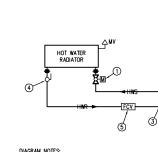


DIAGRAM NOTES:

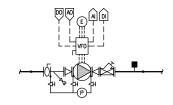
1. 1/2" SELF-REGULATING THERMOSTATIC CONTROL VALVE:
2. DRAN VALVE WITH CAPPED HOSE ADAPTOR REQUIRED AT ALL LOW POINTS FOR DRANAGE
3. 1/2" BRANCH PIPE TO RADIANT HEATER.
4. SHUT-OF SERVICE VALVE.
5. FLOW CONTROL VALVE FOR FLOW LIMITING.

HOT WATER RADIATOR PIPING SCALE: NONE

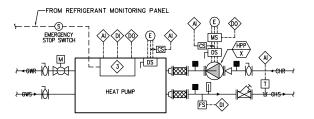
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SHEET NOTES

- SEE SHEET M114 FOR SEQUENCE OF OPERATION, AND ADDITIONAL CONTROL REQUIREMENTS.
- 2. SEE SHEET MOO1 FOR CONTROL LEGEND.



HYDRONIC PUMPS SCALE: NONE



- DIAGRAM NOTES:

 1. CONNECT ALL DDC CONTROL POINTS TO LOCAL DDC CONTROLLER: SIEMENS. PROVIDE ADDITIONAL CONTROLLERS AS REQUIRED FOR NUMBER OF POINTS.

 2. CONNECT 24 VOLT POWER FROM STEP-DOWN TRANSFORMER IN LOCAL CONTROL PANEL

 3. HEAT PUMP DDC CONTROL OF INTERNAL FUNCTIONS, INCLUDING COMPRESSORS, REFRIEGRANT CIRCUITS, AND ALL SAFETIES. SEE MFR SUBMITTAL FOR CONTROL WIRING
- ___ HEAT PUMP SCALE: NONE

THOREST STATUS				
PRELIN	/INARY	/ - NOT FOR C	CONSTRUCTION	I
ISSUE				
1	10/20/2008	30% PRICING		
2	12/19/2008	60% PRE-FINAL NASA RE	VIEW	
3	01/19/2009	60% FINAL ISSUE TO NAS	iA.	
4	02/16/2009	90% QAQC & COST ESTIN	MATE	
MARK	DATE	DESCRIPTION		
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DESIGNED M. CALLAHAN	DATE		Ames Researc	
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REQUESTOR	DATE	IIVAC		
RAQA	DATE		DIAGRAMS	
SAFETY	DATE			
SUPERVISOR S. PAINTER	DATE	SIZE CAGE CODE D 25307	A232-0800-	M111 4
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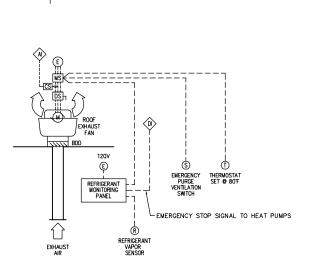


DIAGRAM NOTES:

1. 2-WAY CONTROL VALVE.

2. CAPPED DRAIN VALVE WITH HOSE ADAPTOR REQUIRED AT ALL LOW POINTS FOR DRAINAGE

3. AIR VENT REQUIRED WHEN TAPPED INTO TOP OF MAINS.

4. 1/2" BRANCH PIPE TO PANEL.

5. LINE SIZE SHUT-OFF SERVICE VALVE

6. FLOW CONTROL VALVE FOR FLOW LIMITING.

| CEILING RADIANT COOLING PANELS (CRCP)

-KXXXI-4

- XXXX +

RADIANT COOLING PANEL

RADIANT COOLING PANEL

RADIANT COOLING PANEL

DISCRETE PIPING COMPONENTS MAY BE COMBINED IN AVAILABLE KITS.

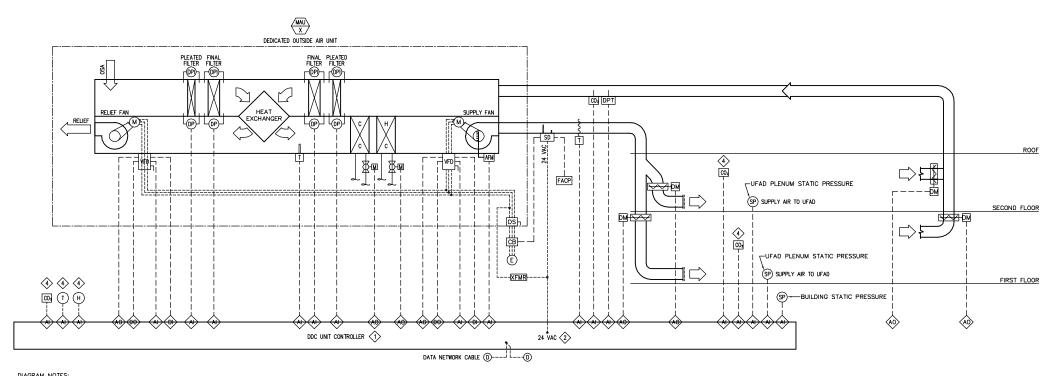
DIAGRAM NOTES:

1. REFRIGERANT GAS SENSOR: GASTECH #3890T, TYPICAL.

2. REFRIGERANT GAS MONITOR PANEL OUTSIDE CHILLER ROOM: GASTECH #1620, TYPICAL. CALIBRATE AND ADJUST MONITORS.

REFRIGERANT PURGE SCALE: NONE

- SEE SHEET M114 FOR SEQUENCE OF OPERATION, AND ADDITIONAL CONTROL REQUIREMENTS.
- 2. SEE SHEET MOO1 FOR CONTROL LEGEND.

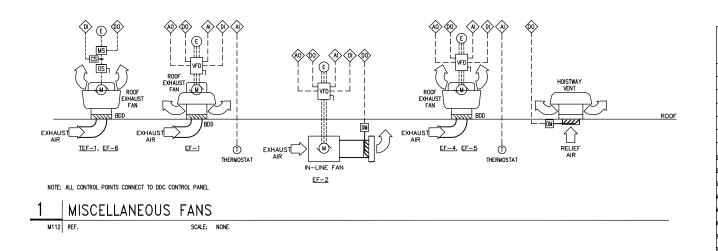


- DIAGRAM NOTES:

 CONNECT ALL DOC CONTROL POINTS TO DDC UNIT CONTROLLER: SIEMENS PXC24 FOR ROOFTOP APPLICATION WITH COMMUNICATION COMPATIBLE WITH CONTROL SYSTEM. FACTORY MOUNT INSIDE UNIT CONTROL PANEL. PROVIDE ADDITIONAL CONTROLLERS AS REQUIRED FOR NUMBER OF POINTS.

- REFER TO SHEET M501 FOR NUMBER AND LOCATION OF CO2 SENSORS ON EACH FLOOR.

2 DEDICATED OUTSIDE AIR SYSTEMS (DOAS) M112 REF. SCALE: NONE



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ISSUE 1	10/20/2008	30% PRICING		
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SYSTEM, APPARATUS, OR AREA POINT DESCRIPTION	HEAT PUMP CURRENT DRAW LOAD WATER SUPPLY TEMP. LOAD WATER RETURN TEMP. GROUND SOURCE EWT GROUND SOURCE LWT	SUPPLY AIR DRY BULB TEMP.	SUPPLY AIR DEW POINT	RELIEF AIR DRY BULB TEMP.	RELIEF AIR DEW POINT	RELIEF AIR CO2 CONCENTRATION	BUILDING STATIC PRESSURE	OSA DRY_BIIIB TEMP	OSA WET-BULB TEMP. (2)	ᇹ		ROOM AIR DRY BULB LEMP.	KOOM OPERAINE IEMP.	ROOM HUMIDITY	ROOM CO2 CONCENTRATION	REFRIGERANT CONCENTRATION	PUMP DIFFERENTIAL PRESSURE			FAN STATUS	FILTER PRESSURE DROP	DUCT (UNIT) SMOKE DETECTOR		PIIMP STATIIS		and the second s	HEAT PUMP START/STOP	HEAT PUMP CAPACITY	COOLING CAPACITY	GOUND SOURCE ISO VALVE	CHS TEMP SET POINT	HWS TEMP SET POINT	FAN START/STOP	SUPPLY FAN SPEED	RELIEF FAN SPEED	EXHAUST FAN SPEED	CHILLED WATER VALVE POSITION	HEATING WATER VALVE POSITION	BUILDING PRESSURE SET POINT	HEAT DIMP STANDRY VALVES	TEM TOME SIMINDE VALVES	DIIND CTADT /CTAD	PUMP SPFFD	LEATING WATER WING ISO VALVE	HEALING WAIER WING ISO VALVE	HEAT PUMP ALERT		FAN FAILURE	SUPPLY AIR LOW LIMIT	ROOM HUMIDITY HIGH LIMIT	FILTER HIGH PRESSURE DROP	5	ROOM TEMPERATURE HIGH LIMIT	PUMP FAILURE	OCCUPANCY SCHEDULE	PUMP	ATURE	HWS TEMPERATURE SET POINT	SUPPLY AIR DEW POINT SET PT.	SUPPLY AIR TEMP SET POINT	CO2 DIFFERENTIAL SET POINT	OPTIMUM START TIME	MORNING WARM UP	MORNING WARM UP	VENTILATION PRE-PURGE	PUMP PRESSURE DIFF SET POINT	RFI IEF AIR CO2 TRENDING	DEW POINT TRENDING	HEAT PUMP CURRENT TRENDING	ALARM INSTRUCTION
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- NOTES:

 1. TABLE IS TO SHOW FUNCTIONAL INTENT, AND IS NOT INTENDED TO BE A COMPLETE AND EXACT LIST OF ALL POINTS REQUIRED. DESIGN AND INSTALL CONTROL SYSTEM TO PERFORM AND FUNCTION AS REQUIRED BY SEQUENCE OF OPERATION.

 2. AMBIENT AIR SENSORS ON MAU-1 ONLY.

 3. TERMINATE ALL I/O POINTS IN FMCS PANEL

 4. DATA CABLE LINK CONSISTS OF 20 GA. TWISTED SHIELDED PAIR.

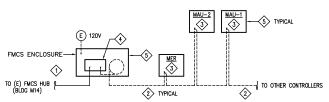


DIAGRAM NOTES:

- fiber optic cable to bldg 10 per code Jt specifications.
- DATA NETWORK CABLE IN CONDUIT: RS-485 BNL (BUILDING LEVEL NETWORK)
 TRUNK, 24 AWG, 1 PAIR, TWISTED, SHIELDED CABLE. CONNECT ALL DDC
 CONTROLLERS, TYPICAL. "DASY-CHAIN" CONNECTIONS IN AND OUT OF
 CONTROLLER WITHOUT SPLICES.
- CONTROLLER WITHOUT SPLICES.

 UNIT DDC CONTROLLER, TYPICAL: PROVIDE ROOF RATED CONTROLLER FOR MAU-1
 AND MAU-2. REFER TO RESPECTIVE CONTROL DIAGRAMS FOR FUNCTION.

 FIBER OPTIC TRUNK INTERFACE DRIVER PER CODE JT SPECIFICATIONS.
- SENCIOSURES: NEMA 1 WITH DEDICATED 120V, 15A, 5—15R DUPLEX RECEPTACLE.
 COORDINATE PANEL AND DEVICE NUMBER AND LABELLING WITH GOVERNMENT
 MAINTENANCE CONTRACTOR, TYPICAL.

1 DDC ARCHITECTURE

SHEET NOTES

- SEE SHEET M114 FOR SEQUENCE OF OPERATION, AND ADDITIONAL CONTROL REQUIREMENTS.
- 2. SEE SHEET MOO1 FOR CONTROL LEGEND.

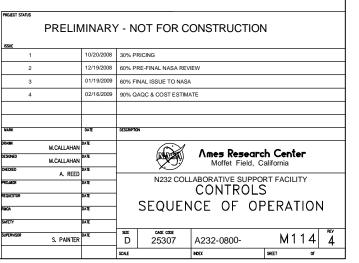
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2		12/19/2008	60% P	RE-FINAL NASA REV	IEW			
3		01/19/2009	60% FI	NAL ISSUE TO NASA				
4		02/16/2009	90% Q	AQC & COST ESTIMA	ATE			
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- GENERAL: ENABLE ALL HEAT PUMPS DURING SCHEDULED OCCUPANCY. ENABLE HEATING HEAT PUMP FOR HEATING DURING MORNING WARM—UP.
- HEAT PUMP SEQUENCE: COMMAND LEAD COOLING HEAT PUMP (CHILLER) TO START WHEN CHS TEMPERATURE IS ABOVE SET
 POINT. COMMAND LEAD HEATING HEAT PUMP (HP-4) TO START WHEN HWS TEMPERATURE IS BELOW SET POINT. COMMAND
 LAC COOLING HEAT PUMP TO START WHEN OHS TEMPERATURE RISES TO +27E ABOVE SET POINT. COMMAND STANDBY
 HEATING HEAT PUMP (HP-3) TO START WHEN HWS TEMPERATURE RISES TO -27E ABOVE SET POINT.
- 3. PRIMARY PUMP: START ASSOCIATED LOAD WATER PRIMARY PUMP WHEN HEAT PUMP IS COMMANDED TO START.
- 4. GROUND SOURCE ISOLATION VALVE: OPEN ASSOCIATED SOURCE WATER ISOLATION VALVE WHEN HEAT PUMP IS COMMANDED TO START
- 5. HEAT PUMP: START COMMANDED HEAT PUMP UPON PROOF OF SUFFICIENT FLOW OF LOAD WATER AND GROUND SOURCE WATER BY NITERAL FLOW SWITCHES. MODULATE CAPACITY BY AFCORY INTERNAL CONTROLS TO WAINTAIN LEAVING LOAD WATER TEMPERATURE SET POINT. SEND SUMMARY ALARIM TO FMCS, IF HEAT PUMP MALPHOKIONS.
- 6. HEAT PUMP ALTERNATION: ALTERNATE LEAD COOLING HEAT PUMP WEEKLY.
- B. GROUND SOURCE WATER PUMPS (GWP-1, GWP-2):
- PUMPS: START AND OPERATE BOTH PUMPS WHENEVER SECONDARY CHILLED WATER OR HEATING WATER PUMPS ARE
 OPERATING. OPERATE BOTH PUMPS AT SAME SPEED. MODULATE PUMP SPEED TO MAINTAIN OPERATING PRESSURE
 DIFFERENTIAL SET POINT BETWEEN SUPPLY AND RETURN, NULSES IN WATER SDIE ECONOMIZER MODE.
- 2. WATER SIDE ECONOMIZER: WHEN HEAT PUMPS ARE NOT OPERATING, MODULATE PUMP SPEED TO MAINTAIN CHS TEMPERATURE SET POINT.
- C. CHILLED WATER SYSTEM
- SYSTEM SEQUENCE: ENABLE PUMP AND HEAT PUMP OPERATION DURING SCHEDULED OCCUPANCY, UNLESS LOCKED OUT. LOCK OUT PUMPS DURING ECONOMIZER MODE.
- 2. CHILLED CEILING PANEL LOOP: START SECONDARY PUMPS (CHP-1, CHP-2) WHEN HEATING WATER ZONE VALVES ARE
- DOAS LOOP: START SECONDARY PUMPS (CHP-3, CHP-4) WHEN A DOAS CHW VALVE IS OPEN, OR A LOBBY 3-WAY VALVE IS DIVERTED TO CHILLED WATER. LOCK OUT PUMPS DURING ECONOMIZER MODE.
- 4. SECONDARY CHILLED WATER PUMPS: OPERATE BOTH CHP-1 & CHP-2 AT SAME SPEED. OPERATE BOTH CHP-3 & CHP-4 AT SAME SPEED. MODULATE PUMP SPEED TO MAINTAIN RESPECTIVE OPERATING PRESSURE DIFFERENTIAL SET POINT BETWEEN SUPPLY AND RETURN.
- 5. CRCP COOLING HEAT PUMPS: COMMAND LEAD HEAT PUMP TO START WHEN CHILED WATER TEMPERATURE IS ABOVE SET POINT. REFER TO HEAT PUMP OPERATION FOR START SEQUENCE. MANTAIN LEAVING WATER TEMPERATURE SET POINT (60Y) FOR CRCP. RESET LEAVING WATER TEMPERATURE SET POINT HIGHER WHEN NONE OF THE CRCP ZONE CHW CONTROL VALVES ARE 1007 OPEN.
- 6. DOAS COOLING HEAT PUMP: COMMAND DOAS HEAT PUMP (HP-3) TO START WHEN CHILLED WATER TEMPERATURE IS ABOVE SET POINT. REFER TO HEAT PUMP OPERATION FOR START SEQUENCE. MAINTAIN LEAVING WATER TEMPERATURE SET POINT (45°F) FOR DOAS. RESET LEAVING WATER TEMPERATURE SET POINT HIGHER WHEN BOTH DOAS CHW CONTROL VALVES ARE LESS THAN 80% OPEN.
- 7. STANDBY: WHEN EITHER COOLING HEAT PUMP FAILS, COMMAND LAG HEAT PUMP TO START.
- 8. ALARMS: NOTIFY FMCS, IF EITHER CHS TEMPERATURE IS BELOW SET POINT RANGE.
- D. HEATING WATER SYSTE
- SYSTEM SEQUENCE: ENABLE PUMP AND HEAT PUMP OPERATION FOR MORNING WARM-UP, PRE-PURGE, AND DURING SCHEDULED OCCUPANCY, UNLESS LOCKED OUT. LOCK OUT HEATING AFTER MORNING WARM-UP WHEN OSA TEMPERATURE IS ABOVE 65F.
- SECONDARY HEATING WATER PUMPS: START SECONDARY PUMPS WHEN ANY HEATING ZONE VALVE IS OPEN, OR WHEN A DOAS HEATING WATER CONTROL VALVE IS OPEN. OPERATE BOTH PUMPS AT SAME SPEED. MODULATE PUMP SPEED TO MAINTAIN OPERATING PRESSURE DIFFERITHAL SET POINT BETWEEN SUPPLY AND RETURN.
- 3. HEATING HEAT PUMP: COMMAND HEAT PUMP TO START WHEN HWS TEMPERATURE IS BELOW SET POINT. REFER TO HEAT PUMP OPERATION FOR START SEQUENCE. POSITION STANDBY HEATING VALVES FOR NORMAL OPERATION. MAINTAIN LEAVING WATER TEMPERATURE SET POINT (110°T). RESET LEAVING WATER TEMPERATURE SET POINT LOWER WHEN ALL PERIMETER ZONE TEMPERATURES ARE ABOVE SET FOINT.
- 4. STANDBY: WHEN HEATING HEAT PUMP FAILS, COMMAND STANDBY LAG HEAT PUMP TO START. POSTION STANDBY HEATING VALVES FOR STANDBY OPERATION.
- STANDBY HEATING VALVES: DURING NORMAL OPERATION, 2-WAY ISOLATION VALES ON LOAD WATER PIPING BETWEEN HP-3
 AND HP-4 ARE CLOSED, AND VALVES BETWEEN HP-2 AND HP-3 ARE OPEN. WHEN STANDBY HEATING IS COMMANDED,
 OPEN BOTH 2-WAY ISOLATION VALES BETWEEN HP-3 AND HP-4, AND CLOSE BOTH 2-WAY ISOLATION VALES BETWEEN HP-2
 AND HP-3.
- 6. ALARMS: NOTIFY FMCS, IF HWS TEMPERATURE IS BELOW SET POINT RANGE.
- MORNING WARM-UP: OPTIMIZE WARM-UP START TIME BASED ON DUTSIDE AR TEMPERATURE AND AVERAGE ROOM AIR
 TEMPERATURE RELATIVE TO HEATING SET POINT. COMPUTE AND COMPARE WARM-UP START TIME FOR OFFICE AND LOBBY
 AREAS. START WARM-UP AT EARLIER COMPUTED START TIME. COMPLETE LOBBY WARM-UP PRIOR TO SCHEDULED
 OCCIDENTALY OF BILLIONIC COMPLETE CREEK WARM-UP PRIOR TO PEP-DIEDE OF BILLIONIC
- NIGHT SETBACK RESTART: WHEN AVERAGE PERIMETER ROOM TEMPERATURE FALLS 15F BELOW HEATING SET POINT, AUTOMATICALLY RESTART HEATING SYSTEM USING WARM-UP SEQUENCE. TERMINATE WARM-UP WHEN AVERAGE PERIMETER ROOM TEMPERATURE. RISES TO 10F BELOW ROOM HEATING SET POINT.
- . BUILDING HV
- RADIANT WALL PANELS: SELF-REGULATING 2-WAY CONTROL VALVE MODULATES HEATING WATER FLOW RATE TO MAINTAIN ROOM TEMPERATURE HEATING SET POINT (ADJUSTABLE).
- HEATING WATER ZONE VALVES: OPEN 2-WAY ZONE VALVES WHILE SECONDARY HEATING WATER PUMPS ARE OPERATING, UNLESS ZONE IS LOCKED OUT. LOCK OUT ZONE WHEN WINDOWS ARE OPEN, OR RADJANT COOLING PANELS ARE ENABLED. CLOSE BOTH SUPPLY AND RETURN ZONE VALVES WHEN ZONE IS LOCKED OUT.
- ZONE CHILLED RADIANT CEILING PANELS: MODULATE ZONE CONTROL VALVE TO MAINTAIN ROOM TEMPERATURE COOLING SET POINT. CLOSE 2-WAY VALVES WHILE IN ECONOMIZER MODE. OTHERWISE
- NATURAL VENTILATION: MINIMUM VENTILATION IS PROVIDED BY OPERABLE WINDOWS. OPEN AND MODULATE WINDOW POSITION
 FOR NATURAL VENTILATION TO MAINTAIN CO2 CONCENTRATION BELOW SET POINT.
- 5. DEMAND CONTROLLED VENTILATION: SEE DOAS SEQUENCE OF OPERATION.
- F. LOBBY HVAC
- RADIANT FLOOR 3-WAY VALVES: POSITION 3-WAY VALVE TO DIVERT RETURN WATER TO HEATING WATER RETURN LOOP, UNLESS ZONE TEMPERATURE EXCEEDS HEATING RANGE. OTHERWISE, POSITION VALVE TO DIVERT RETURN WATER TO COOLING WATER RETURN LOOP.
- RADIANT FLOOR ZONE CIRCULATING PUMPS: OPERATE PUMP DURING SCHEDULED OCCUPANCY, AND DURING WARM-UP
 PERIOD, INVERSELY MODILATE SPEED OF ZONE CIRCULATING PUMP TO MAINTAIN ROOM HEATING TEMPERATURE SET POINT
 WHEN 3-WAY VALVE IS IN HEATING POSITION, DIRECTLY MODILATE ZONE CIRCULATING PUMP TO MAINTAIN ROOM COOLIN
 TEMPERATURE SET POINT, 3-WAY VALVE IS IN COOLING POSITION.
- 3. NATURAL VENTILATION: MINIMUM VENTILATION IS PROVIDED BY MANUAL OPERATION OF LOBBY DOORS BY OCCUPANTS, AND EXHAUST OF THE LUNCH AREA BY TOILET EXHAUST FAN DURING SOFEDULED OCCUPANCY. OPEN AND MODULATE WINDOW POSTION FOR NATURAL VENTILATION TO MAINTAIN COZ CONCENTRATION BELOW SET POINT.
- DEMAND CONTROLLED VENTILATION: WHEN WINDOWS ARE IN FULL OPEN POSITION, START ATRIUM VENTILATION FAN (EF-1), AND MODULATE FAN SPEED TO MAINTAIN CO2 CONCENTRATION BELOW SET POINT.
- ECONOMIZER: OVERRIDE CO2 CONTROL, AND START ATRIUM VENTILATION FAN (EF-1) WHEN ROOM TEMPERATURE IS ABOVE COOLING TEMPERATURE SET POINT. MODULATE FAN SPEED TO MAINTAIN ROOM COOLING TEMPERATURE SET POINT.

- G. DEDICATED OUTSIDE AIR UNITS (MAU-1 AND MAU-2):
- UNIT OPERATION: ENABLE UNIT TO OPERATE DURING SCHEDULED OCCUPANCY, PLUS ONE HOUR PRIOR TO SCHEDULED OCCUPANCY
- Outside air and relief air dampers: Open osa damper prior to starting supply fan, and open relief damper prior to starting supply fan. Close damper after respective fan is stopped.
- 3. SUPPLY AIR FAN: START FAN ONE HOUR BEFORE SCHEDULED OCCUPANCY FOR PRE-PURCE. PROVE OUTSIDE AIR AND RELEF AIR DAMPERS ARE OPEN BEFORE STARTING FAN. MODULATE FAN SPEED TO DELIVER SCHEDULED MINIMUM OSA, AS MEASURED BY FLDW MEASURING STATION. STOP FAN DURING NATURAL VENTULATION MODE (WINDOWS OPEN). STOP FAN UPON DETECTION OF SMOKE BY DUCT SMOKE DETECTOR, OR FIRE ALARM SYSTEM.
- 4. ECONOMIZER: DURING DOAS OPERATION, OVERRIDE FAN SPEED WHERE HIGHER SPEED IS REQUIRED TO MAINTAIN SUPPLY AIR TEMPERATURE SET POINT. STOP ECONOMIZER OVERRIDE WHEN DSA ENTHALPY IS HIGHER THAN RETURN AIR ENTHALPY.
- RELIEF AIR FAN: INTERLOCK FAN TO OPERATE WHEN SUPPLY FAN IS OPERATING. PROVE RELIEF AIR DAMPER IS OPEN BEFORE STARTING FAN. MODULATE FAN SPEED TO MAINTAIN BUILDING STATIC PRESSURE (PROGRAMMABLE) IN RESPECTIVE BUILDING MING. CALIBRATE STATIC PRESSURE SET POINT FOR SLIGHT POSITIVE (+0.05 Wg) PRESSURE IN MING SERVED WHEN
- DEMAND CONTROLLED VENTILATION: WHEN WINDOWS ARE IN FULL OPEN POSITION, START RESPECTIVE RELIEF FAN ONLY, AND MODULATE RELIEF FAN SPEED TO MAINTAIN COZ CONCENTRATION BELOW SET POINT. WHEN WINDOWS ARE CLOSED, OVERRIDE SUPPLY FAN SPEED AS REQUIRED TO MAINTAIN COZ CONCENTRATION BELOW SET POINT.
- 7. MORNING WARM UP: DOAS DOES NOT OPERATE DURING MORNING WARM-UP.
- 8. CHILLED WATER COIL: MODULATE CHILLED WATER CONTROL VALVES TO MAINTAIN CONSTANT SUPPLY AIR TEMPERATURE SET POINT. CLOSE CONTROL VALVE WHEN SUPPLY FAN IS OFF, OR DURING ECONOMIZER OVERRIDE.
- 9. DEHUMIDIFICATION: ONLY WHEN RADIANT COOLING PANELS ARE OPERATING, LOWER SUPPLY AIR TEMPERATURE SET POINT TO MAINTAIN MAXIMUM LEAVING AIR DEW POINT TEMPERATURE SET POINT. NOTIFY FINCS WHEN LEAVING AIR DEW POINT TEMPERATURE EXCEDES SET POINT BY 15. RESET LEAVING AIR DEW POINT IEMPERATURE SET POINT 10 HOLD ALL MEASURED ROOM DEW POINT TEMPERATURES TO MAXIMUM SET POINT. RESET MAXIMUM ROOM DEW POINT TEMPERATURE SET POINT TO IT BELLOW CHILLED WATER SUPPLY TEMPERATURE TO RADIANT COOLING PANELS.
- 10. REHEAT COIL: MODULATE HEATING WATER FLOW TO MAINTAIN SUPPLY AIR TEMPERATURE SET POINT.
- HUMIDITY: TREND LOG RETURN AIR DEW POINT TEMPERATURE BY FMCS. NOTIFY FMCS WHEN ANY ROOM DEW POINT TEMPERATURE EXCEEDS HIGH LIMIT (PROGRAMMABLE) OR BELOW LOW LIMIT (PROGRAMMABLE).
- 12. FILTER BANK: MONITOR DIFFERENTIAL PRESSURE ACROSS BANK. ALARM FMCS AT HIGH PRESSURE LIMIT.
- H. EXHAUST FANS:
- TOILET EXHAUST FAN (TEF-1) AND JANITOR EXHAUST FAN (EF-6): OPERATE CONTINUOUSLY DURING SCHEDULED OCCUPANCY.
- ELECTRIC ROOM EXHAUST FANS: START FAN WHEN ROOM TEMPERATURE EXCEEDS ROOM TEMPERATURE OF 80°F. MODULATE FAN SPEED TO MAINTAIN ROOM TEMPERATURE SET POINT (90°F). MINIMUM FAN SPEED TO BE SET FOR STABLE OPERATION WITHOUT OVERHEATING FAN MOTOR OR VED.
- I. COMM AND TEL/DATA ROOMS:
- 1. DUCTLESS DX FAN COILS, AND ASSOCIATED CONDENSING UNITS, MUST BE AVAILABLE TO OPERATE AT ANY TIME.
- 2. TEMPERATURE CONTROL: UNIT THERMOSTATIC CONTROLLER SHALL CONTROL AND OPERATE INDOOR AND OUTDOOR UNITS TO MAINTAIN ROOM TEMPERATURE SET POINT (90°F). NOTIFY FMCS WHEN SPACE TEMPERATURE EXCEEDS HIGH LIMIT SET POINT
- J. ELEVATOR MACHINE ROOM: SAME AS COMM AND TEL/DATA ROOMS.
- K. MISCELLANEOUS
 - CONTROL SET POINTS: SET POINTS, HIGH LIMITS, AND LOW LIMITS SHALL BE PROGRAMMABLE BY FMCS. PROGRAM SET POINT, FEEDBACK, AND CONTROL RANGE FOR STABLE OPERATION, AND TO PREVENT SHORT CYCLING OF EQUIPMENT.
- 2. OCCUPANCY SCHEDULE: SCHEDULE SHALL BE PROGRAMMABLE BY FINCS. CHANGES MAY BE MADE BY REQUEST TO FINCS.
- 3. EQUIPMENT ENABLE: ALLOW EQUIPMENT TO BE STARTED, UNLESS LOCKED OUT FOR SERVICE.
- 4. EQUIPMENT MONITORING: MONITOR EQUIPMENT STATUS, UNLESS LOCKED OUT FOR SERVICE. DETERMINE FAN STATUS BY CURRENT SWITCH. DETERMINE PUMP STATUS BY PRESSURE DIFFERENTIAL BETWEEN OUTLET AND INLET. DETERMINE HEAT PUMP STATUS FROM UNIT SUMMARY ALARY.
- EQUIPMENT ALARMS: NOTIFY FMCS AND STOP EQUIPMENT FAILS TO START OR CONTINUE OPERATING WHEN COMMANDED, AFTER ALLOWING SUFFICIENT TIME FOR START SEQUENCE TO COMPLETE. IDENTIFY SPECIFIC UNIT OR DEVICE THAT FAILED.
- 6. COMBINATION FIRE & SMOKE DAMPERS: CLOSE ALL DAMPERS UPON DETECTION OF SMOKE OR HEAT BY FACP..

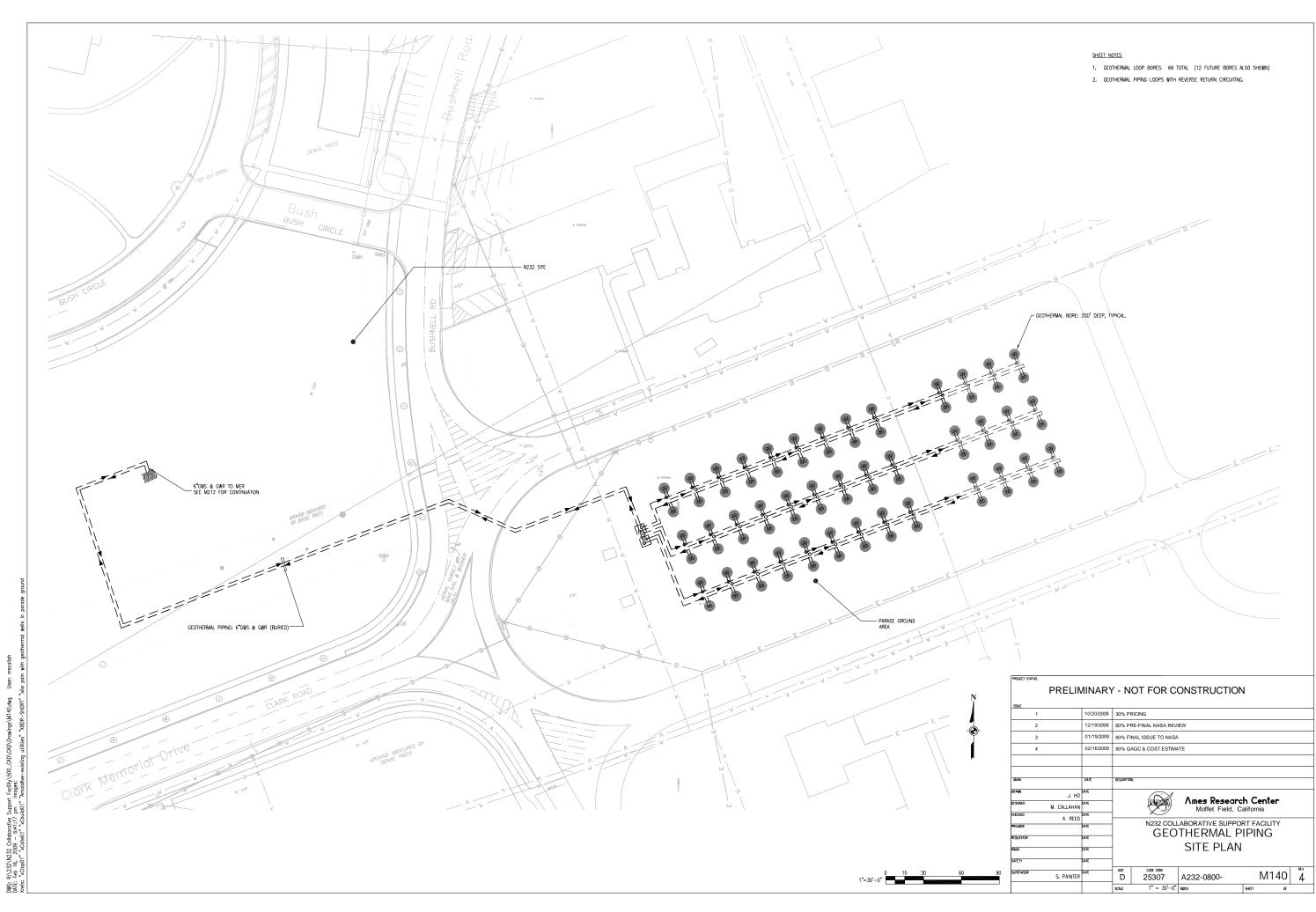
HVAC CONTROL NOTES

- DESIGN AND INSTALL CONTROL SYSTEM TO PERFORM AND FUNCTION AS REQUIRED BY SEQUENCE OF OPERATION. DESIGN AND INSTALLATION SHALL CONFORM TO ASCS SECTION 19500. PROVIDE ALL EQUIPMENT, COMPONENTS, WIRING, CONDUIT, CONNECTIONS AND PROGRAMMING NECESSARY FOR A FULLY FUNCTIONAL SYSTEM.
- ALL WIRING AND CABLES SHALL BE INSTALLED IN CONDUIT. ALL CONDUIT SHALL BE AS SPECIFIED IN DIVISION 16. LOW VOLTAGE POWER, SIGNAL AND DATA WIRING AND CABLES SHALL BE PROVIDED BY DIVISION 15. SEE ELECTRICAL DRAWNISS FOR OTHER REALTED WORK.
- COORDINATE CONTROLS WITH AMES FMCS SYSTEM. SUBMIT CUT SHEETS FOR ALL PROPOSED FMCS EQUIPMENT, INCLUDING WIRING DIAGRAMS AND CONTROL DETAILS.
- 4. PROGRAM AMES FMCS AS REQUIRED. COORDINATE FMCS PROGRAMING WITH GOVERNMENT FMCS COORDINATOR. PROGRAMMING MUST BE DONE BY SEIMENS.
- 5. PROVIDE NEW FMCS PANELS AND ENCLOSURES AS NEEDED TO ACCOMMODATE ALL SPECIFIED POINTS.
- 6. ALL CONTROL DEVICES, WIRING AND CONDUIT SHALL BE NEW. SPLICING OF WIRES IS NOT ACCEPTABLE
- 7. EXTEND 24 VAC POWER TO ALL LOW VOLTAGE CONTROL DEVICES FROM LOCAL PANEL OR CONTROLLER.

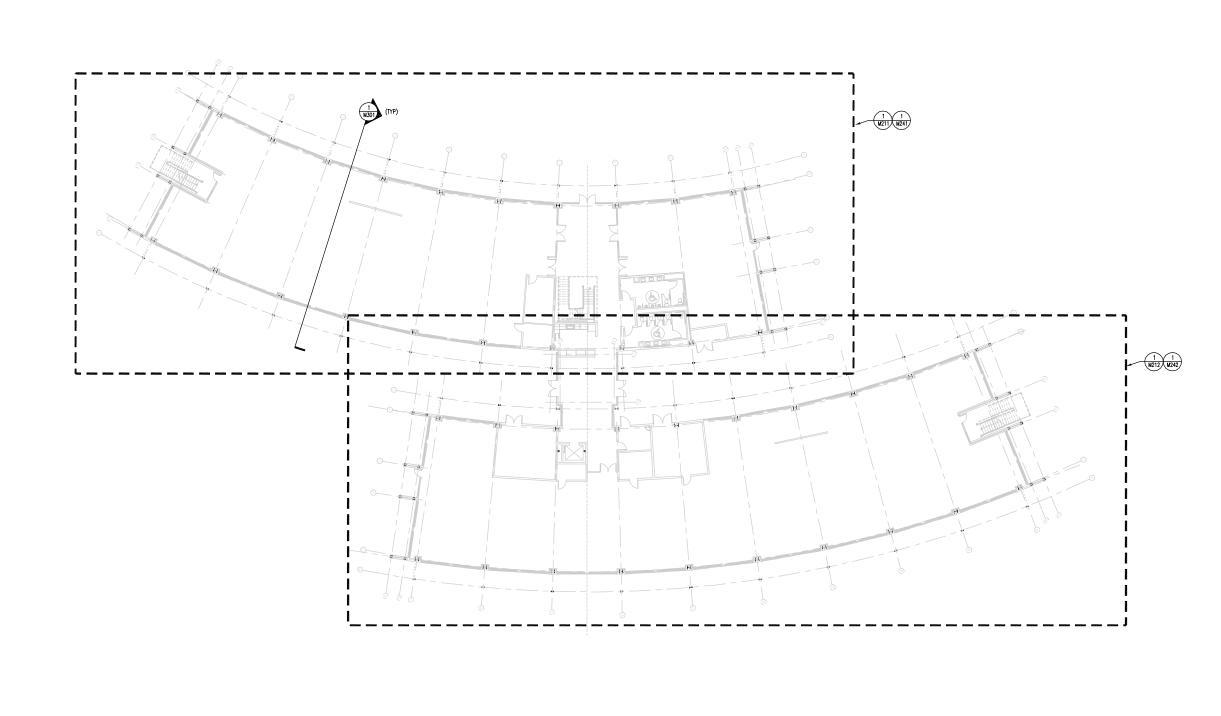


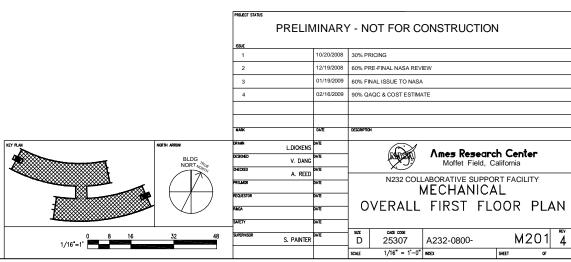
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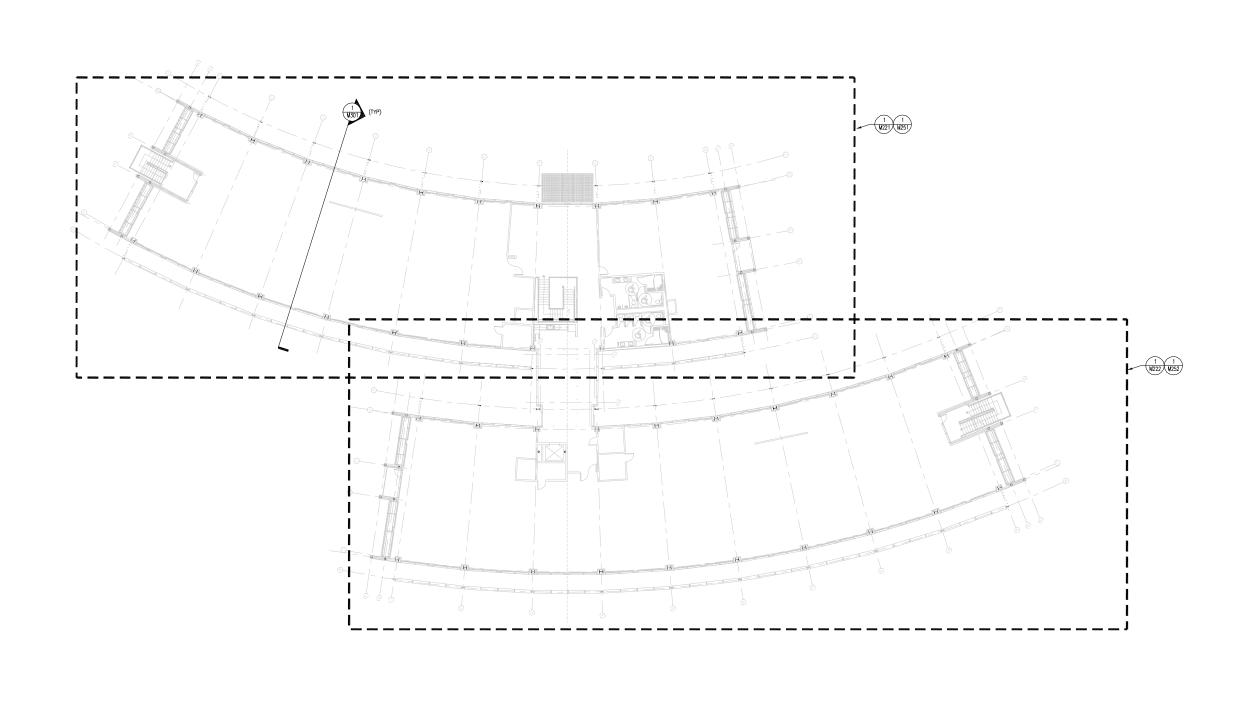


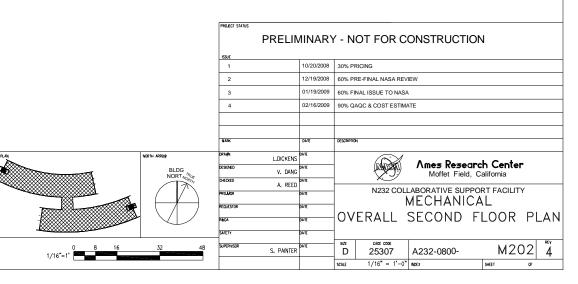
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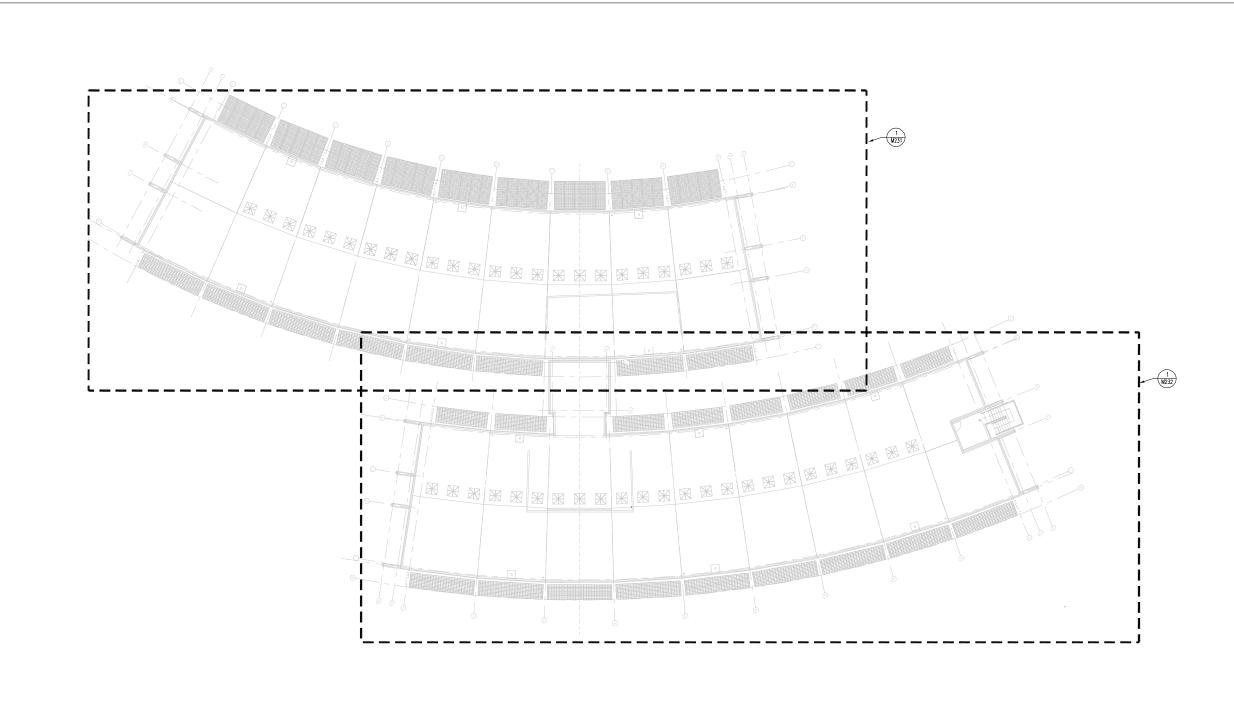


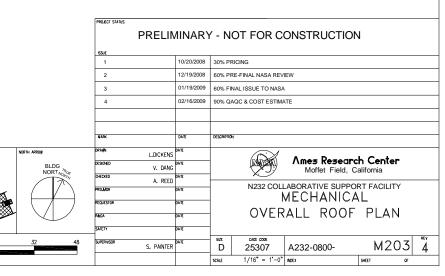


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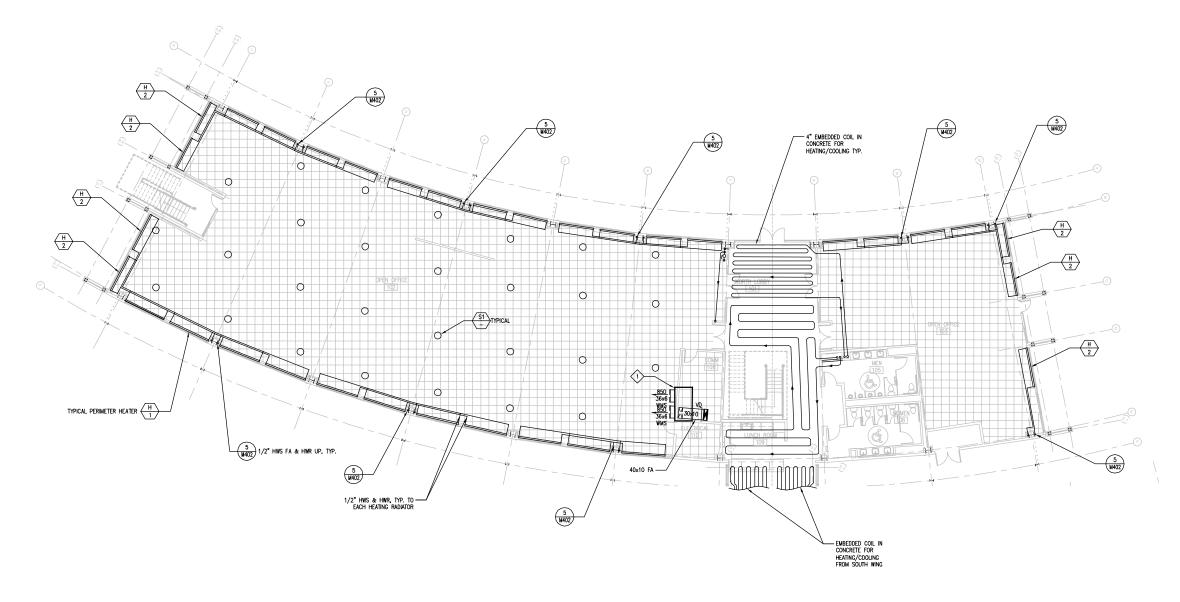
DNS: KYZZY, MAZZ CURROGORANE SUBBOTT FACINITY SOU_CAUNCHU NITURNINGS (M.ZOSSUNG USER: IJINO 1815: Feb 13, 2009 – 11,321.4 am Images: Xrefs: "XMRD1" "XBRR—SARD1" "XARD01"

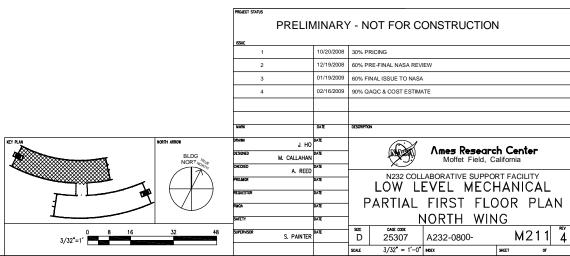
SHEET NOTES

1. SEE SHEET M601 FOR EQUIPMENT SCHEDULES

KEY NOTES

PLENUM DIVIDER EMPLOYED IN RAISED ACCESS FLOOR FOR AIR DISTRIBUTION (DMDER PROVIDED BY RAISED FLOOR VENDOR).





DWG: R:\232\N232 Collaborative Support Facility\500_CAD\CAD\Draw DATE: Feb 16, 2009 — 6:18:08 pm images: xrets: "xeFp1" "xaRc01" "XBDR-SHORT" "xMFP01

SHEET NOTES

1. SEE SHEET M601 FOR EQUIPMENT SCHEDULES KEY NOTES

PLENUM DIVIDER EMPLOYED IN RAISED ACCESS FLOOR FOR AIR DISTRIBUTION (DMIDER PROVIDED BY RAISED FLOOR VENDOR). 4" EMBEDDED COIL IN CONCRETE FOR-HEATING/COOLING, TYP. 1/2" HWS FB & HWR DOWN 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1/2" HWS & HWR, TYP. TO-EACH HEATING RADIATOR 5 M402 1/2" HWS FB & HWR DOWN, TYP. TYPICAL PERIMETER HEATER PRELIMINARY - NOT FOR CONSTRUCTION 10/20/2008 30% PRICING 12/19/2008 60% PRE-FINAL NASA REVIEW 01/19/2009 60% FINAL ISSUE TO NASA 02/16/2009 90% QAQC & COST ESTIMATE Ames Research Center Moffet Field, California M. CALLAHAN A. REED N232 COLLABORATIVE SUPPORT FACILITY LOW LEVEL MECHANICAL PARTIAL FIRST FLOOR PLAN SOUTH WING

SIZE CAGE CODE 25307

3/32" = 1'-0" NDEX

A232-0800-

DWC: R.\232\N232 Collaborathe Support Facility\500_CAD\CAD\Drawi DATE: Feb 16, 2009 — 6:19:17 pm images: xrets: "xAFD1" "xARCD1" "XBDR-SHORT" "xMFD1

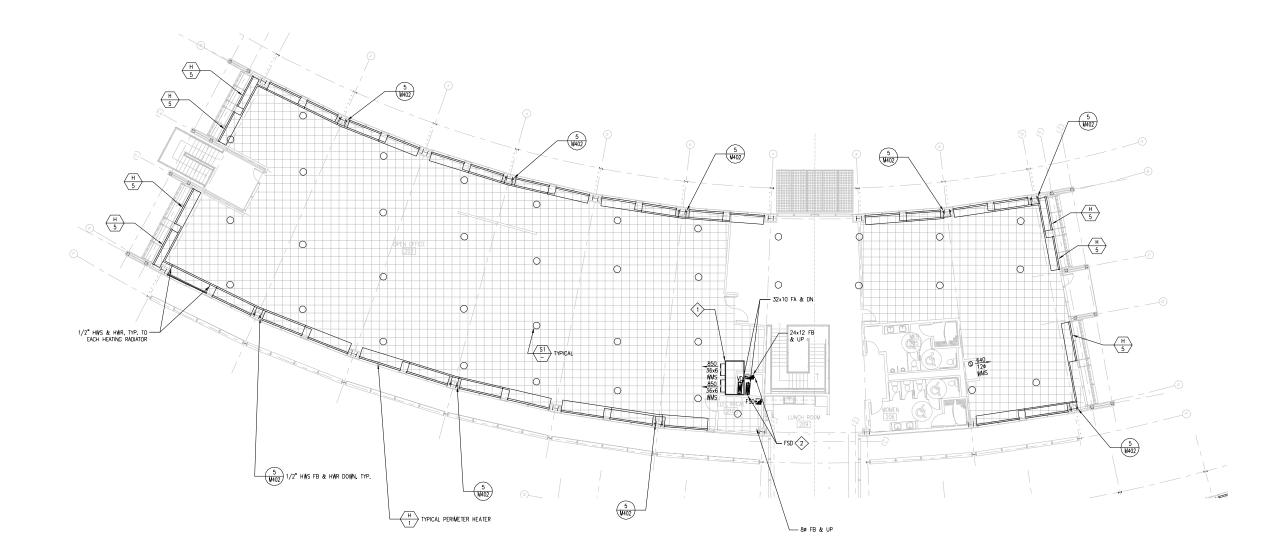
SHEET NOTES

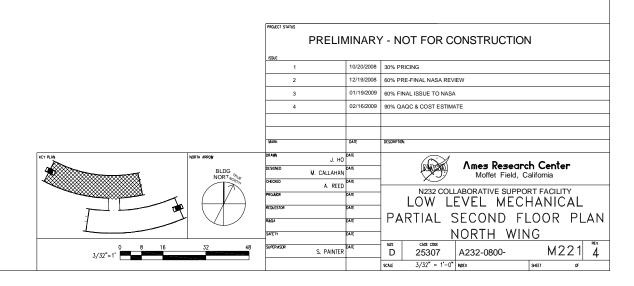
1. SEE SHEET M601 FOR EQUIPMENT SCHEDULES

KEY NOTES

PLENUM DWIDER EMPLOYED IN RAISED ACCESS FLOOR FOR AIR DISTRIBUTION (DWIDER PROVIDED BY RAISED FLOOR VENDOR),

2 PROVIDE FSD AT STRUCTURAL FLOOR PENETRATION.





DWG: R\232\N232 Collaborative Support Facility\500_CAD\ DATE: Feb 16, 2009 – 6:20:18 pm images: xrets: "xAFP02" XBDR-SHORT" "xMFP02

PARTIAL SECOND FLOOR PLAN SOUTH WING

A232-0800-

M222 4 4

SCALE 3/32" = 1'-0" NDEX

DWG: R\232\N222 Collaborative Support Facility\500_CAD DATE: Feb 16, 2009 – 6:21:20 pm Images: xrets: "xAFP02" "XBDR-SHORT" "xMFP02 CHS & CHR DN-HWS & HWR DN-SERVICE ACCESS STAIR

- SHEET NOTES

 1. SEE SHEET M601 FOR EQUIPMENT SCHEDULES
- INSTALL 1" DUCT LINER FOR SUPPLY AND RETURN DUCTS ABOVE ROOF,

 $\stackrel{\text{KEY NOTES}}{\Longleftrightarrow} \text{ fresh outside air intake below relief air duct,}$

PRELIMINARY - NOT FOR CONSTRUCTION

10/20/2008 30% PRICING 12/19/2008 60% PRE-FINAL NASA REVIEW 01/19/2009 60% FINAL ISSUE TO NASA 02/16/2009 90% QAQC & COST ESTIMATE

M. CALLAHAN

N232 COLLABORATIVE SUPPORT FACILITY
MECHANICAL PARTIAL ROOF PLAN

Ames Research Center Moffet Field, California

-NORTH WING SCALE 3/32" = 1'-0" NDEX

CHS & CHR DN -

- SHEET NOTES

 1. SEE SHEET M601 FOR EQUIPMENT SCHEDULES
- INSTALL 1" DUCT LINER FOR SUPPLY AND RETURN DUCTS ABOVE ROOF.

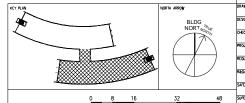
KEY NOTES

FRESH OUTSIDE AIR INTAKE BELOW RELIEF AIR DUCT.

PRELIMINARY - NOT FOR CONSTRUCTION

M. CALLAHAN

10/20/2008 30% PRICING 12/19/2008 60% PRE-FINAL NASA REVIEW 01/19/2009 60% FINAL ISSUE TO NASA 02/16/2009 90% QAQC & COST ESTIMATE



Ames Research Center Moffet Field, California

N232 COLLABORATIVE SUPPORT FACILITY
MECHANICAL PARTIAL ROOF PLAN

-SOUTH WING SCALE 3/32" = 1'-0" NDEX A232-0800-

/−1½* HWS & HWR /-2" HWS & HWR ┌─1" HWS & HWR 1½" HWS & HWR-L14" CHS & CHR E1 2" CHS & CHR 32x10 FA L_{1" HWS & HWR} 5 M402) 1/2" HWS FA & HWR UP, TYP. 5 M402 └_2½" CHS & CHR

KR, 232/NC22 Colleborative Support Facility, 500_CAD\, CAD\, CAD\, Drawings\, W241.dwg User: mscalleh Tere for 2009 = £243.8 mm magast m. magast m. magast m. magast wider views: vs. 200911" vs. 2001" vs. 2001 Vs. 2008-cs. 20081". AMPPOI

KEY PAM

MORTH ARROW

PROJECT

PROJECT

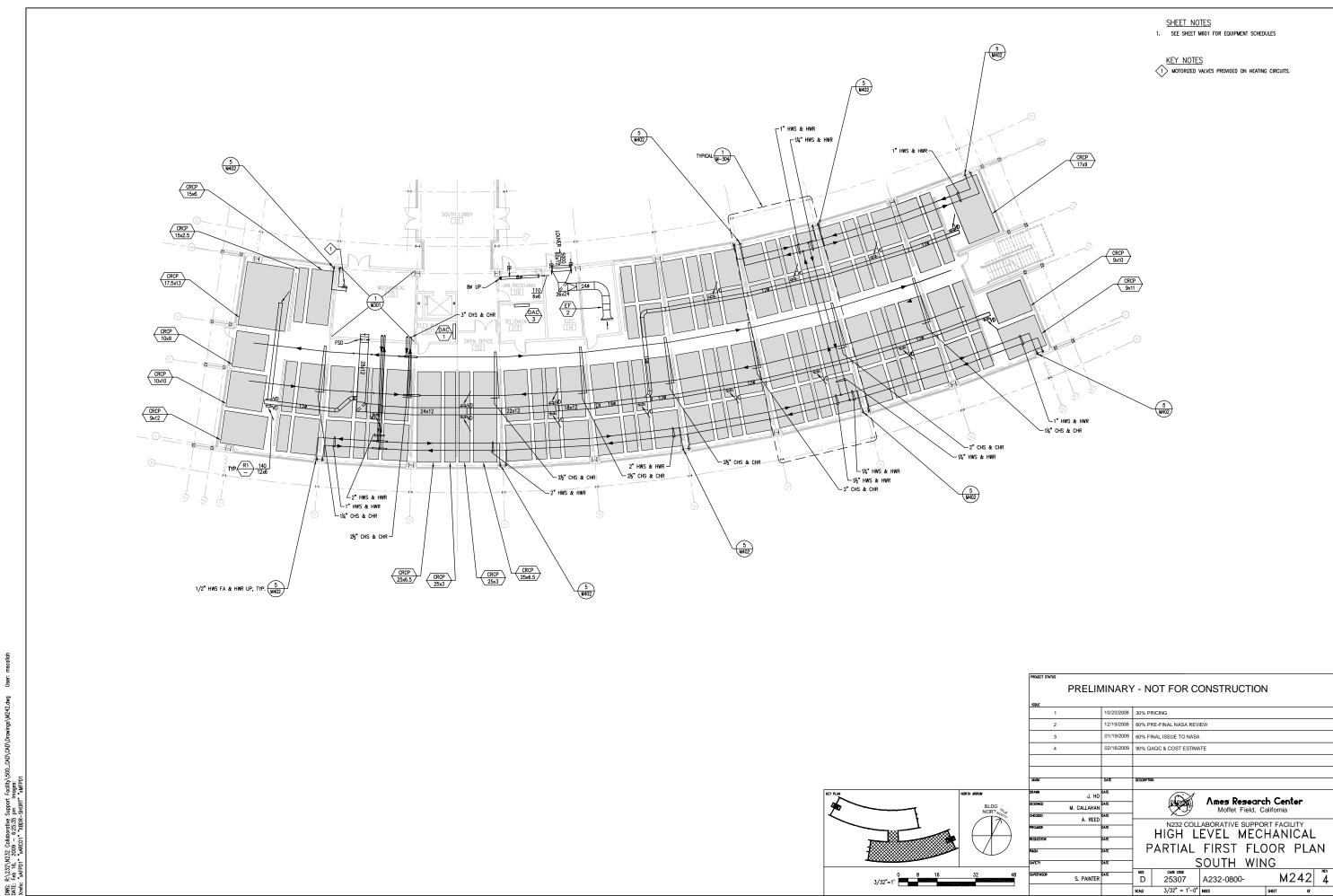
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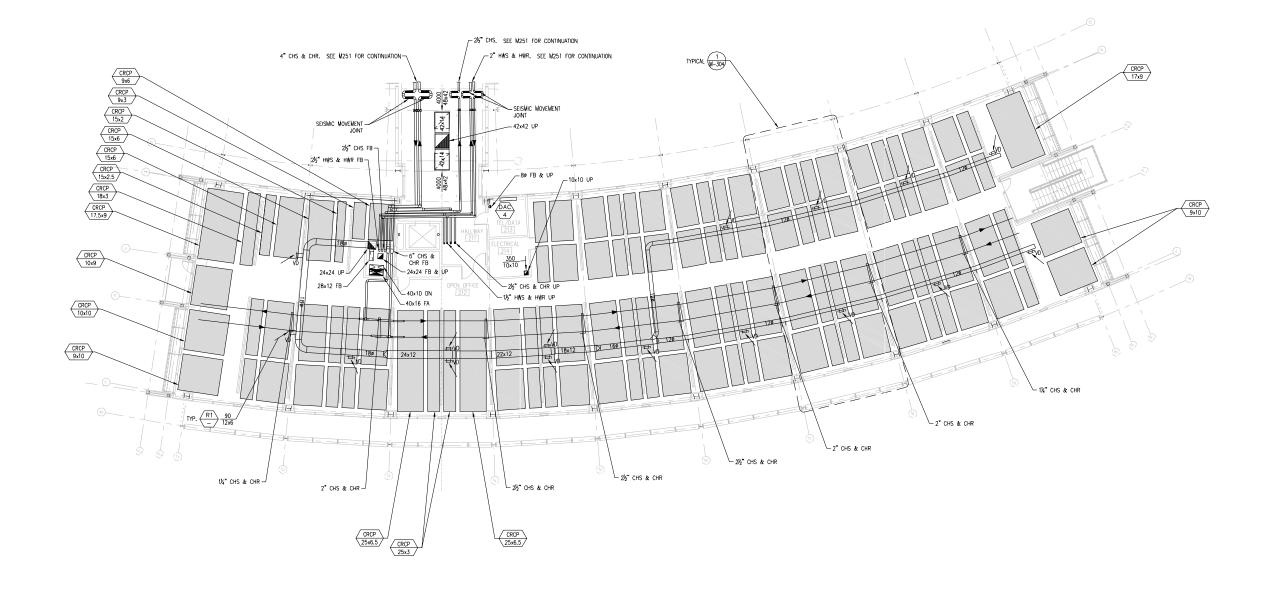
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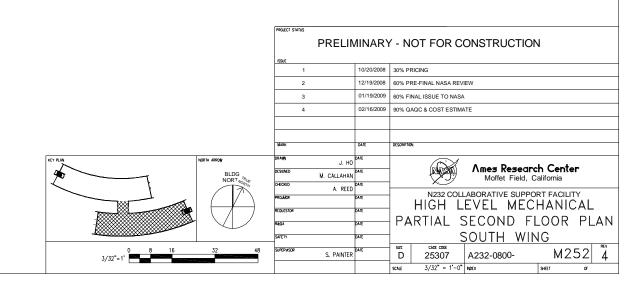
| NORTH WING | SEAT | NORTH | WING | SEAT | NORTH | SEAT |



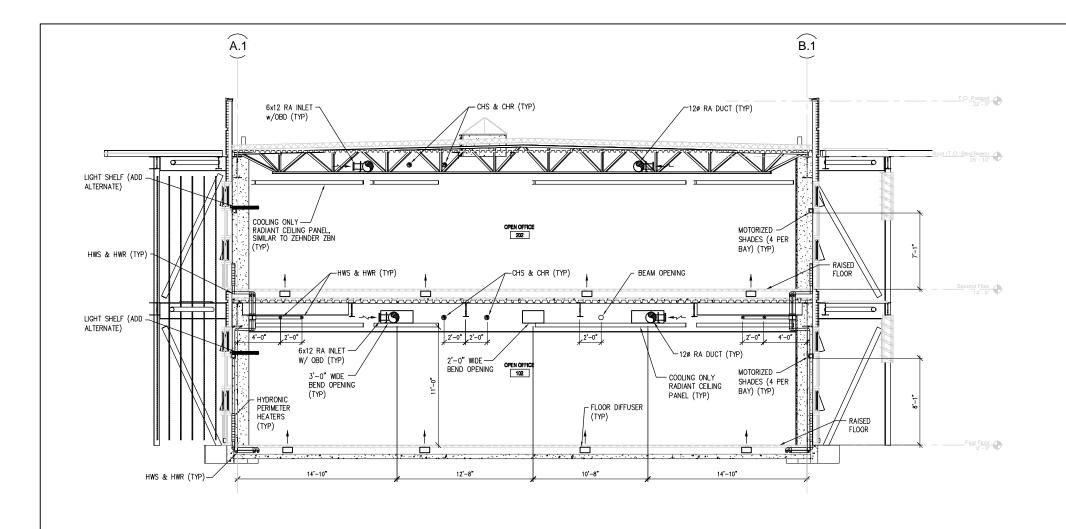
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1. SEE SHEET M601 FOR EQUIPMENT SCHEDULES

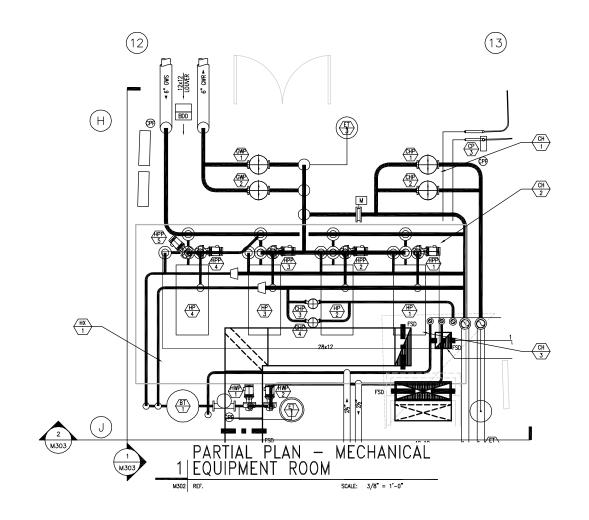


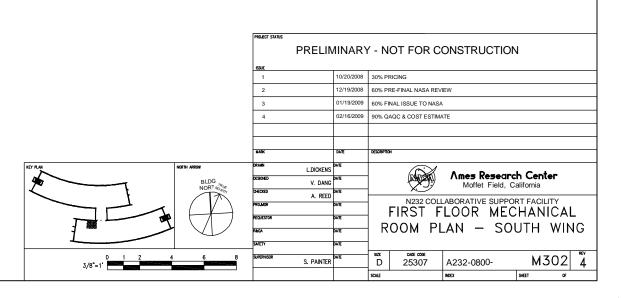


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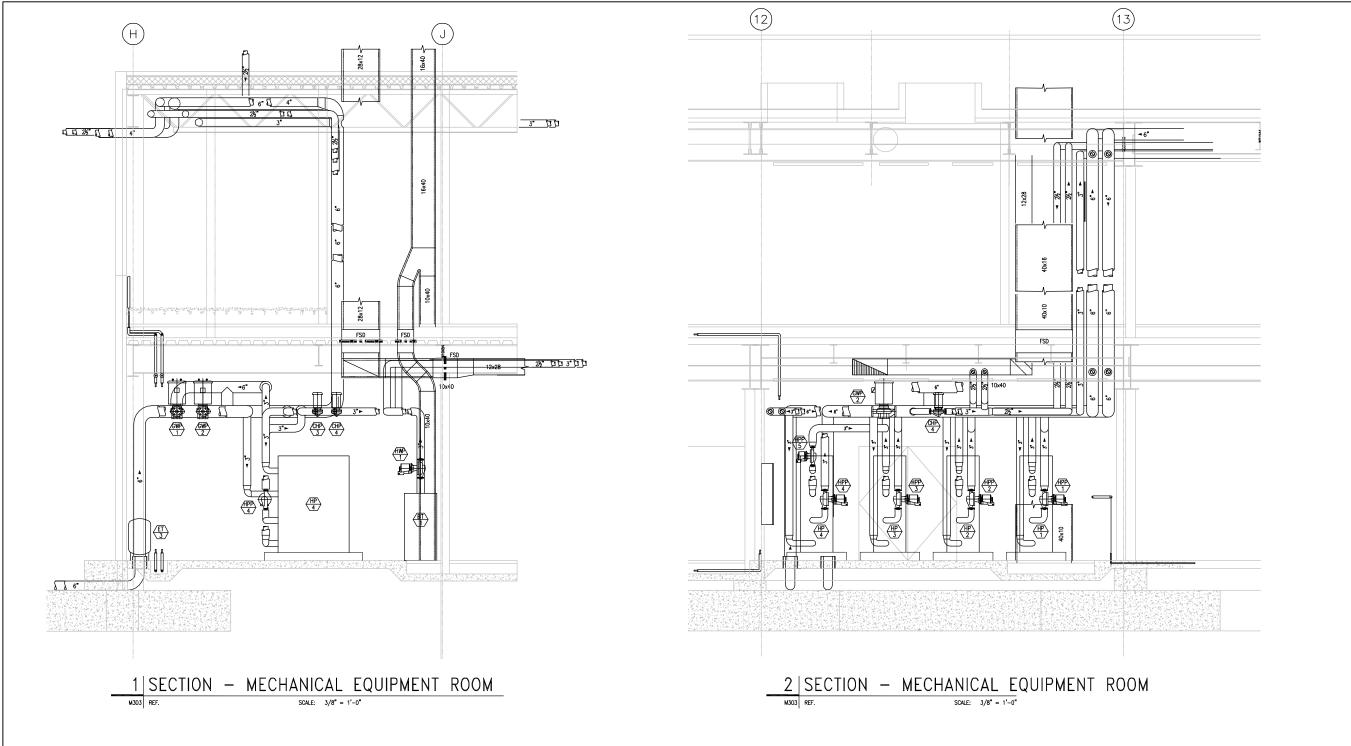


PRELIMINARY - NOT FOR CONSTRUCTION 10/20/2008 30% PRICING 12/19/2008 60% PRE-FINAL NASA REVIEW 01/19/2009 60% FINAL ISSUE TO NASA 02/16/2009 90% QAQC & COST ESTIMATE Ames Research Center
Moffet Field, California V. DANG A. REED N232 COLLABORATIVE SUPPORT FACILITY MECHANICAL SECTIONS 25307 M301 4 SZE D A232-0800-1/4" = 1'-0" NDEX

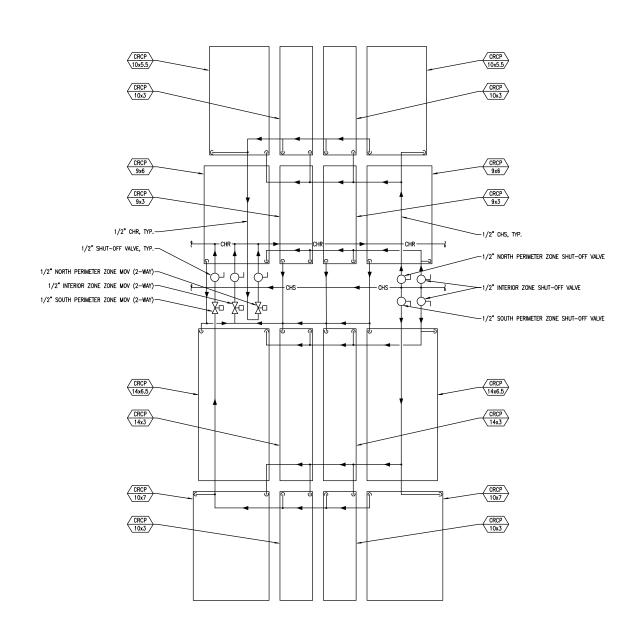




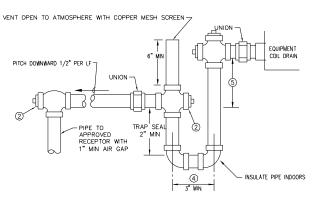
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3	01/19/2009	60% F	INAL ISSUE TO NASA			
4	02/16/2009	90% C	AQC & COST ESTIMA	TE		
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DESIGNED M. CALLAHAN	DATE			Moffet Field, Ca		
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SAFETY	DATE					
SUPERVISOR S. PAINTER	DATE	SIZE D	25307	A232-0800-	М303	4
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PROJECT STATUS						
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ISSUE						
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2		12/19/2008	60% P	RE-FINAL NASA REVI	EW	
3		01/19/2009	60% F	INAL ISSUE TO NASA		
4		02/16/2009	90% Q	AQC & COST ESTIMA	TE	
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SUPERWOOR	S. PAINTER	DATE	D	25307	A232-0800-	M304 4
			SCALE	1/4" = 1'-0"	INDEX	SHEET OF



DETAIL NOTES:

1. SEE EQUIPMENT SCHEDULE FOR TRAP SIZE, NOT LESS THAN EQUIPMENT CONNECTION. MANUALLY FILL TRAP BEFORE START UP TO FORM INITIAL

- SEAL.

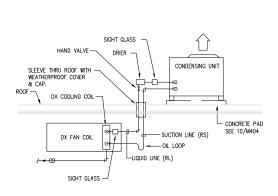
 SEAL.

 PIPE TEE OR CROSS WITH CLEANOUT PLUG.
 PIPING SHALL BE DWY COPPER TUBING.
 OFFSET DRAIN LINE RISER FROM CONNECTION TO PAN FOR ACCESS TO
 CLEANOUT PLUGS.

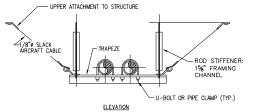
 PRAIN INVERT: 1.25 x FAN STATIC PRESSURE IN "WG FOR DRAW THROUGH

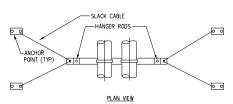
POSONDENSATE TRAP

SCALE: NONE

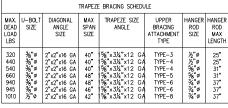


DUCTLESS SPLIT PIPING



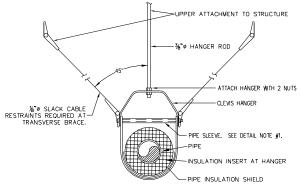


5	PIPE	TRAPEZE			
M 401	REF.		SCALE:	NONE	



TRAPEZE APPICATION LIMITATIONS:
TRAPEZE SCHEDULE IS BASED ON MAXIMUM FOUR PIPES OF EQUAL
SIZE OF 4" AND SMALLER. HOWEVER, ANY COMBINATION OF PIPES
CAN BE USED IF THE TOTAL COMBINED WEIGHT OF THE PIPES ON A
TRAPEZE DOES NOT EXCEED THE MAX. DEAD LOAD LISTED, AND
TRAPEZE DOES NOT EXCEED MAX. SPAN LISTED.

VIBRATION ISOLATORS:
WHERE VIBRATION ISOLATORS ARE SPECIFIED, PROVIDE UPWARD LIMIT STOP AT TRAPEZES WHERE BRACES ARE REQUIRED.



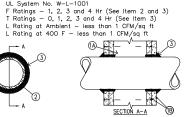
DETAIL NOTES:

- REQUIRED AT TRANSVERSE BRACES ONLY, INSIDE DIAMETER OF SLEEVE IS 1/2" LARGER THAN BOLT.
- 2. SEE SPECIFICATIONS FOR BRACING REQUIREMENTS.



UL System No. W-L-1001





1. Wall Assembly - The 1, 2, 3 or 4 hr. fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:

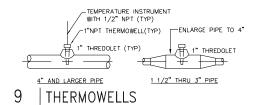
A. Studs - Wall framing may consist of either wood studs (max 2 h fire reated assemblies) or steel channel studs. Wood studs to conssit of nom 2 by 4 in. lumber spaced 16 in. OC with nom 2 by 4 in. lumber and plates and cross braces. Steel studs to be min. 3-5/8 in. wide by 1-3/8" deep channels spaced max 24 in. OC.

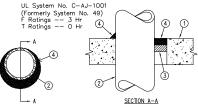
B. Wallboard, Cypsum* - Nom 1/2 or 5/8 in, thick, 4 ft. wide with square or tappered edges. The gypsum wallboard type, thickness, number of layers, fastner type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of pening is 13.5 in.

2. Pipe or Conduit - Nom 12 in. diam (or smaller) Schedule 10 (or heavier) steel pipe, nom 12 in. diam (or smaller) class 50 (or heavier) dustle iron pressure pipe, nom 6 in. diam (or smaller) class 50 (or heavier) dustle iron pressure pipe, nom 6 in. diam (or smaller) steel conduit, nom 4 in. diam (or smaller) steel electrical metallic tubing, nom 6 in. diam (or smaller) Type L (or heavier) capper tubing or nom 1 in. diam (or smaller) steel steel conduit. When capper pipe is used, max F Rating of fire stop system (Item 3) is 2 hr. Steel pipes or conduits larger than nom 4 in. may only be used in walls constructed using steel channel studs. A max of one pipe or conduit is permitted in the fire stop nasytem. Pipe or conduit to be installed near the center of the stud cavity width and to be rigidly supported on both sides of the walls.

3. Fill, Vold or Cavity Material bearing the UL classification marking (Caulk) - Caulk fill material installed to completely fill annular space beteen pipe or conduit and the gypsum wallboard and with a min 1/4 in. diam bed of caulk applied to perimete

below:				
Max Pipe Diam, In	<u>, Annular S</u>	pace, In. F Ra	ting, Hr.	T Rating,
Hr.				
1	0 to ¾e	1 or 2	0+, 1	or 2
1	1⁄4 to 1∕2	3 or 4	3 or 4	
4	0 to 1/4	1 or 2	0	
4	0 to 1½ #	1 or 2	0	
6	1/4 to 1/2	3 or 4	0	
12	3/ ₆ to 3/ ₈	1 or 2	0	
+When copper pip	e is used, T Rating	is 0 hr.		
4#Pっto 1-1/2" ip.	angular, space appli	es, only wher Type C	P-25 WB+,	caulk is used
and only—when the	e hrint tNicknelst≺oA	thek (g),∤Delum (wba/itAbah	;†-isl)5/8 V M./	∆fdr∥th)r
rated walls and 1-		oted walls.		·/
Minnessota Mining &	Mfa. Co CP 25W	B+ CONTENTION		





1. Floor or Wall Assembly – Min 4–1/2 in, thick lightweight or normal weight (100–150 pcf) concrete. Wall may also be constructed of any UL Classified Concrete Blacket. Max diam of circular through apening is 22–1/2 in. See Concrete Blacket. Max diam of circular through apening is 22–1/2 in. See Concrete Blacket. (CAZT) category in the Fire Resistive Directory for names of manufacturers.

1. Steel Sleeve – (Optional, not shown) – Nom 12 in. diam (or smaller) Schedule 40 (or heavier) steel pipe sleeve cast into concrete floor or wall. Sleeve to be flush with or project max 2 in. from top surface of floor or from both durfaces of wall.

2. Pipe or Conduit – Nom 20 in. diam (or smaller) Schedule 10 (or heavier) steel pipe, nom 6 in. diam (or smaller) cast iron pipe or steel EMT, Max annular space between pipe or conduit and edge of through opening to to exceed 2–1/2 in. Max one pipe or conduit per through opening, Min annular space between pipe or conduit and edge of through opening Min annular space between pipe or conduit and edge of through opening Min annular space between pipe or conduit and edge of through opening Min annular space between pipe or conduit and edge of through opening is zero in. (point contact). Pipe or conduit to be rigidly supported on both sides of floor or wall assembly.

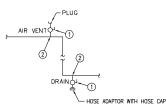
contact). Pipe or conduit to be rigidly supported on both sides of floor or wall assembly.

3. Packing Material — Polyethylene backer rod or nom 1 in. thickness of tighly packed ceramic (alumina silica) fiber blanket, mineral wool batt or glass fiber insulation material used as a permanent form. Packing material to be recessed from top surface of floor or both surfaces of solid concrete or concrete block wall as required to accommodate the required thickness of caulk fill material (Item 4). As an alternate when max pipe size is 10 in. diam and when max annular space is 1 in., a min 1 in. thickness ceramic fiber blanket or mineral wool bott packing material may be recessed min 1/2. from bottom surface of floor or from either side of solid concrete wall.

Fill, Void or Cavity Material bearing the UL classification marking (Caulk) - Applied to the annular space to the min thickness shown in the following

	<u>Max. Annular</u>	Packing Material	Min. Caulk
Diam. In.	Space In.	Type (a) Thick	ness in
10"	1"	BR, CF, GF or MW	½"(ь)
10"	1"	CF or MW	½" (c)
20"	21/2"	BR, CF, GF or MW	1" (b)
a) BR=Polye	thylene backer	rod, CF=Ceramic fiber blar	nket, MW=Mineral v
^{b¢tt} D.I.D.⊏	DEMETE	DATION (DATE	D ELOVD
	10" 10" 20" a) BR=Polye	Diam. In. Space In. 10" 1" 10" 1" 20" 2½" a) BR=Polyethylene backer	Diam. In. Space In. Type (a) Thick 10" 1" BR, CF, GF or MW 10" 1" CF or MW 20" 2½" BR, CF, GF or MW

/ (b) | Habrik-instande Net Mik And Journal of RATIEDA STreet OF Roll M40solidEffnon-concrete block) wall Minnesota Mining & Mfg. Co. - CP 25N/S

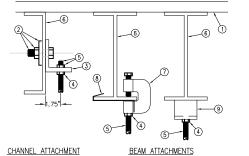


NOTE:

1. BALL VALVE: USE 1/2" BALL VALVE FOR PIPE SIZES UNDER 10". USE 3/4" BALL VALVE FOR PIPE SIZES 10" AND LARGER.

2. PIPE CONNECTION: FULL SIZE BRANCH TEE WITH REDUCER, OR THREADOLET.

MANUAL VENT & DRAIN SCALE: NONE



HANGER	& BOLT SCH	EDULE FOR C	HANNEL ATTA	CHMENT
HANGER SIZE (IN)	ALLOWABLE LOAD, (LBS)	BOLT SIZE (IN)	NUMBER OF BOLTS	ANGLE SIZE (IN)
½" %" ½" %	240 610 1,130 NOT ALLOWED	%" ½" %"	2 2 2 -	3"x3"x¼" 3"x3"x¼" 3"x3"x¼" -

DETAIL NOTES:

1. STEEL ROOF DECK. DO NOT SUPPORT OR BRACE PIPES, DUCTS OR EQUIPMENT FROM ROOF DECK. SUPPORT AS DETAILED FROM BEAM OR SPREADERS.

2. MACHINE BOLT, NUT AND WASHER. REFER TO SCHEDULE FOR

- 2. MACHINE BOLT, NUT AND WASHER. REFER TO SCHEDULE FOR BOLT SIZE.

 3. 33-3½ × 4" LONG STEEL CLIP ANGLE

 1. CINCH NUT

 1. THREADED HANGER ROD AND NUT AS INDICATED BY LOAD OR SCHEDULED IN SPECIFICATIONS. REFER TO SCHEDULE FOR MAXIMUM ALLOWABLE LOAD.

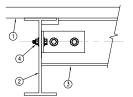
 3. STRUCTURAL STEEL BEAM OR SUPPLEMENTAL STEEL SPREADER.

 7. ADJUSTABLE STEEL BEAM CLAMP WITH RESTRAINING STRAP FOR PIPES. CONCRETE INSERTS MAY BE SUBSTITUTED FOR USE IN REINFORCED CONCRETE DECK.

 3. RESTRAINING STRAP.

TUPPER THANGER ROD ATTACHMENTS

SCALE: NONE

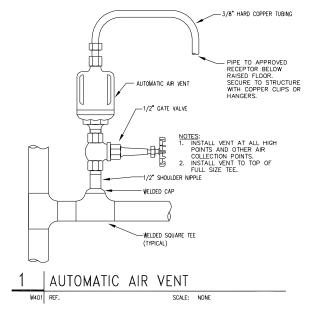


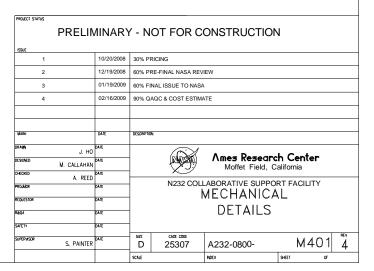
DETAIL NOTES:

1. STEEL ROOF DECK. DO NOT SUPPORT OR BRACE PIPES, DUCTS OR EQUIPMENT FROM ROOF DECK. SUPPORT AS DETAILED FROM BEAM OR

- SPREADERS.
 2. STRUCTURAL STEEL BEAM. REFER TO STRUCTURAL DRAWINGS FOR BEAM
- SIZE.
 3. STEEL SPREADER BEAM. SIZE FOR MAXIMUM DEFLECTION EQUAL TO
- 1/240 OF SPAN. MINIMUM SPEADER: W6x8.5 4. BOLTED BEAM CONNECTION TO STRUCTURAL BEAM. USE STANDARD AISC

TSUPPLEMENTAL SPREADER BEAM





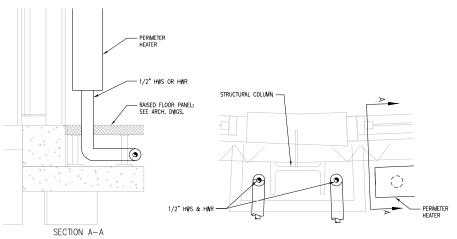
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M401 REF.

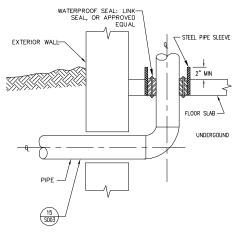
SCALE: NONE

SCALE: NONE

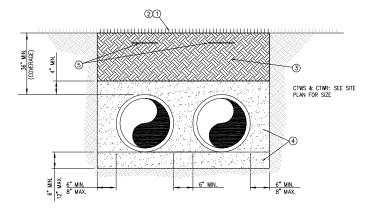
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5 HEATING WATER RISER PIPING





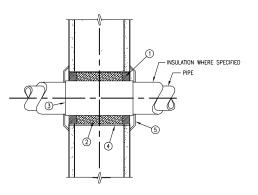


DETAIL NOTES:

- REPLACE EXISTING SOD MATCH EXISTING.
 SIDEWALK: SEE SITE PLAN FOR LOCATION. REFER TO SPECIFICATIONS FOR SIDEWALK AND AGGREGATE BASE INSTALLATION.
 IMPORTED BORROW MECHANICALLY COMPACTED TO 95% RELATIVE DENSITY MINIMUM.
 SAND BEDDING MATERIAL: COMPACT TO 95% RELATIVE DENSITY.
 TRACFR WARNING TAPF- 18" BFLOW GRADF

TRENCH SECTION

M402 REF. SCALE: NONE



- DETAIL NOTES:

 1. SEALANT: SEAL BOTH SIDES WITH ½" THICK UL RATED FIRE STOP CAULK: MINNESOTA MINING AND MFG CO CP 25WB+ FIRE STOP, OR APPROVED EQUAL.

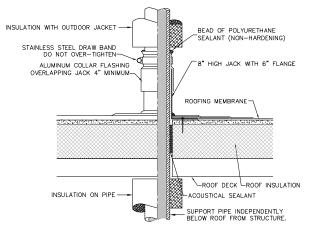
 C. CENTER PIPE WITH ½" MIN SPACE BETWEEN PIPE AND WALL SLEEVE. FILL ANNULUS VOID WITH 4 PCF MINERAL WOOL SAFING.

 3. INSTALL GSM PIPE INSULATION PROTECTION SHIELD FOR INSULATED PIPES.

 4. GSM WALL SLEEVE

 5. CHROME COLLAR ESCUTCHEON AROUND PIPE IN FINISHED AREA, TYPICAL.

2 PIPE PENETRATION (NON-RATED WALL)



<u>DETAIL NOTE:</u>
REFER TO ARCHITECTURAL DWGS FOR SPECIFIC ROOF FLASHING AND ROOF SEALING REQUIREMENTS.



PROJECT STATUS						
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ISSUE						
1	10/20/2008	30% PF	RICING			
2	12/19/2008	60% PF	RE-FINAL NASA REVI	EW		
3	01/19/2009	60% FI	NAL ISSUE TO NASA			
4	02/16/2009	90% Q	AQC & COST ESTIMA	TE		
MARK	DATE	DESCRIPTION				
DRAWN J. HO	DATE		(C)	A D		
DESIGNED M. CALLAHAN	DATE		MARSA	Ames Research Moffet Field, Ca		
CHECKED A. REED	DATE		<u> </u>			
PROJMGR	DATE			ABORATIVE SUPPOR		
REQUESTOR	DATE			<i>I</i> ECHANICA	_	
R&QA	DATE		PII	PING DETA	ILS	
SAFETY	DATE	-				
SUPERVISOR S. PAINTER	DATE	SIZE D	25307	A232-0800-	M402	4
		SCALE		NDEX	SHEET OF	

- DETAIL NOTES:

 1. COMBINATION FRE AND SMOKE DAMPER: CALIFORNA STATE FIRE MARSHALL APPROVED. DAMPER DETAIL IS FOR REFERENCE ONLY. DAMPERS SHALL BE LABELED BY AN APPROVED AGENCY AND INSTALLED STRICTLY PER MANUFACTURER'S PINTED INSTRUCTIONS. MANUFACTURER'S INSTALLATION INSTRUCTIONS SHALL BE MADE AVAILABLE TO THE INSPECTING AUTHORITIES. DAMPER SHALL BE DYNAMIC TYPE WITH ATTACHMENT TO SLEEVE BY DAMPER IS LESS THAN 36". SLEEVE STATE OF 3" MIN. TO 6" MAX. BETOND EACH SIDE OF PARTITION. EXTEND 16" MAX. FROM WALL IF SUPPLIED WITH INTEGRAL FACTORY INSTALLED ACCESS DOOR.

 3. EXPANSION GAP: MINNOUN: %" PER FOOT OF DUCT WIDTH OR HEIGHT. MAXIMUM: %" PER FOOT +1"

 4. RETINING ANGLE: 1%" "X" AF 4G. STEEL FASTENED TO SLEEVE ONLY. OVERLAP EXPANSION GAP 1" MINIMUM.

 5. ANGLE FASTENERS: 5" ON CENTER MAX., MIN. 2 EACH SIDE, MAX. 2" FROM EACH CORNER. WELDS: 1" MIN. LONG FILLETS; BOLTS: ½" "20; SCREWS: #10 SHEET METAL (30" DUCT MAX.)

 6. STEEL STUD FRANMIC; 25 GA MIN. ALL FOUR SIDES. DOUBLE FRANMICS FOR WOOD STUDS.

 7. FIRE RESISTIVE LINING: EQUAL TO FIRE RESISTIVE RATING OF WALL.

 8. DUCT ACCESS PANEL: BY ROWING ACCESS TO FUSBEL BURNS AND FIRE DAMPER! BLADES FOR INSPECTION AND SERVICING. ACCESS PANEL LABEL: "FIRE DAMPER!" 1%" HEIGHT LETTERS. ATTACH

- 7. HIR RESISINE LINKS: EQUAL TO FIRE RESISIVE, KAING OF WALL.

 8. DUCT ACCESS PANEL PROVIDE ACCESS TO FUSIBLE LINKS AND FIRE DAMPER BLADES FOR INSPECTION AND SERVICING, ACCESS PANEL LABEL: "FIRE DAMPER" 1½" HEIGHT LETTERS. ATTACH TO INSULATION.

 9. DUCT ATTACHMENT: S—SLIP JOINT, SEAL WITH DUCT TAPE OR NON—HARDENING NON—COMBUSTIBLE MASTIC COMPOUND. DO NOT SCREW OR BOLT. ALTERNATE: DUCTMATE BREAKAWAY CONNECTIONS WHEN LISTED FOR USE WITH DAMPER, OR S—AND—DRIVEMATE #148BD.

 10. FASTEN SLEEVE TO SHAFT WALL STUD FRAMING WITH #10 SCREWS, MINIMUM TWO PER SIDE (DUCTS OVER 21": MINIMUM 3 AT TOP AND BOTTOM).

ROOF DECK

-ROOF INSULATION

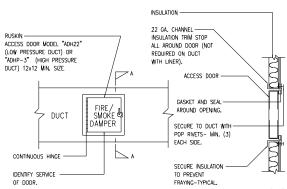
- ACOUSTICAL DUCT LINER

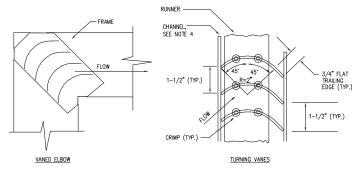
5 COMBINATION FIRE & SMOKE DAMPER





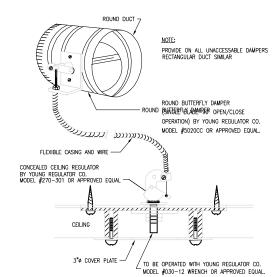
SEE SPECS FOR DUCT INSULATION REQUIREMENTS



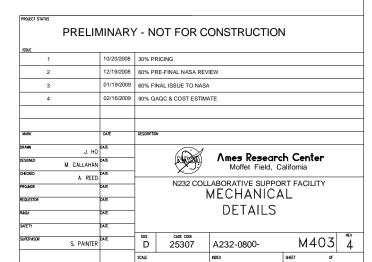


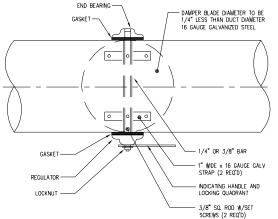
- MAXIMUM UNSUPPORTED VANE LENGTH 36"
- . VANES AND FRAMES 24 GAUGE . DUCT INLET AND OUTLET DIMENSIONS TO BE EQUAL
- 4. FOR HIGH VELOCITY APPLICATIONS PROVIDE 18 GAUGE CHANNEL AND TACK WELD VANE EDGES TO CHANNEL, TYPICAL BOTH ENDS
 5. FRAMES AND CHANNELS BOLTED OR TACK WELDED TO ELBOW



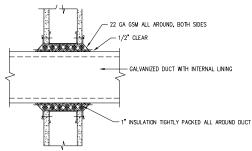


DAMPER AND REGULATOR SCALE: NONE





ROUND MANUAL VOLUME DAMPER

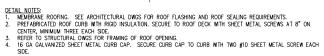


<u>DETAIL NOTES:</u>

1. DRYWALL METAL STUDS OR ANY OTHER RIGID MATERIAL MUST NOT TOUCH DUCT.

2. SUPPORT DUCT FROM HANGERS FOR ACOUSTICAL CONTROL.

DUCT PENETRATION (NON-RATED PARTITION)



Sude.

X" THICK PVC FOAM GASKET TAPE BETWEEN CURB CAP AND CURB.
SECURE MEMBRANE FLASHING TO TOP OF CURB.
BEAD OF POLYURETHANE SEALANT (NON-HARDENING)

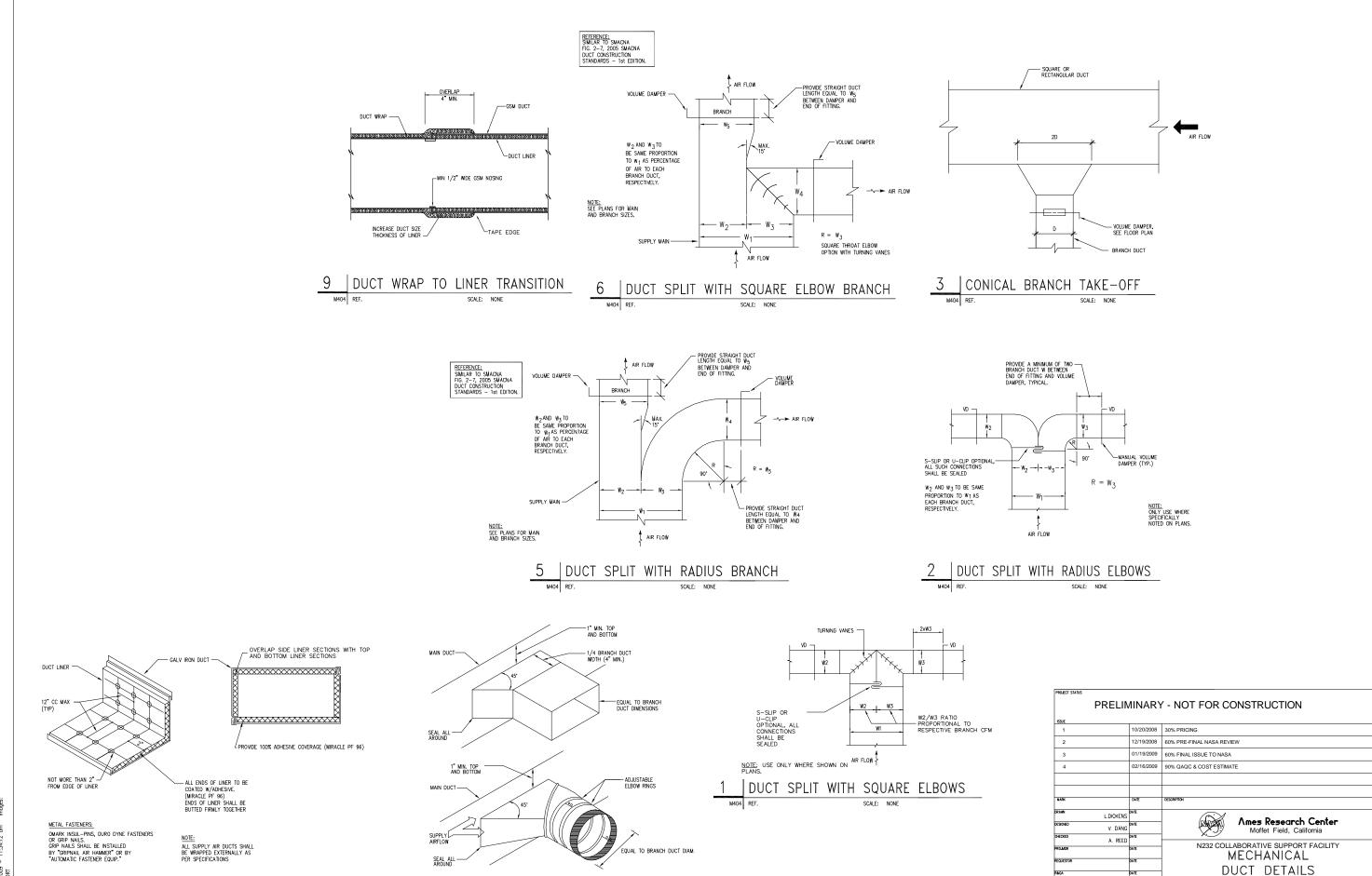
4" MIN.

LINED DUCT RISER -

SCALE: NONE

6 DUCT PENETRATION THROUGH ROOF

ACCESS DOOR SCALE: NONE



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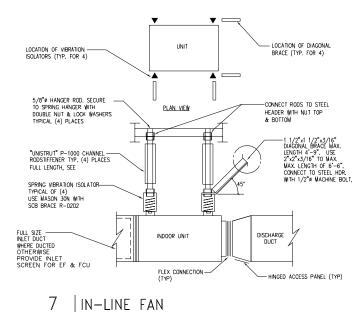
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DUCT TAKE-OFF DETAIL

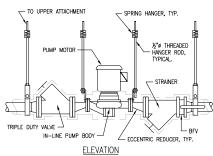
DWC. R.\232\N232 Collaborative Support Facility\500_CAD\CAD\Drawings\M404.dwg User: jiho DMC: Eeb 13, 2009 – 11:34:12 am images: v.nés "Yang-sunor Canaba"

DUCT LINER

8 | CONDENSING UNIT PAD

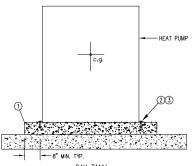


SCALE: NONE



DETAIL NOTES: PIPE INSULATION IS SHOWN DASHED FOR CLARITY.

SUSPENDED IN-LINE PUMP SCALE: NONE



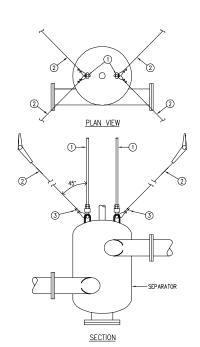
DAY TANK

- DAY TANK

 DETAIL NOTES:

 1. EQUIPMENT PAD: 6" THICK CONCRETE (2,500#) REINFORCED
 WITH 6X6-W2.9-W2.9 WIRE MESH
 2. ANCHOR BOLT TESTING: REFER TO TESTING NOTES BELOW.
 3. X" 0 EXPANSION ANCHOR BOLT (HILT KWIK BOLT II, OR EQUAL)
 WITH 3" MINIMUM EMBEDMENT WITH NUT, WASHER AND
 NEOPRENE GROMMET, ONE REQUIRED AT EACH CORNER. LOAD
 TEST.

HEAT PUMP ANCHORAGE



<u>DETAIL NOTES:</u>

1. SEE DETAIL FOR UPPER ATTACHMENT. USE SPREADER OR ATTACH TO TWO DIFFERENT JOISTS.

- UIFFERENT JUISTS.

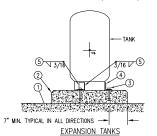
 2. ¼* CABLE BRACE. SEE DETAIL FOR UPPER ATTACHMENT. TYPICAL OF FOUR. SPLAY AT 45'
- STLAT AT 45'

 3. ATTACH CABLE WITH HEAVY WIRE ROPE THIMBLE AND TWO U-BOLT CLAMPS 3"
 APART TYPICAL.

AIR SEPARATOR SUPPORT SCALE: NONE



EXPANSION TANK (PLAN VIEW)



- DETAIL NOTES:

 1. EXISTING STRUCTURAL FLOOR SLAB
 2. NEW 4" THICK HOUSEKEEPING PAD. REFER TO DETAIL.
- New 4" HIGH OUSEKEEPING PAD. REPER TO DETAIL.
 New 5 EXPANSION ANCHOR BOLT WITH NUT AND STEEL WASHER-HILTI KWIK BOLT, II, OR EQUAL. THREE BOLTS REQUIRED (ONE FOR EACH CLIP ANGLE). REFER TO SCHEDULE FOR TESTING REQUIREMENTS. INSTALL TO MINIMUM EMBEDMENT SCHEDULED.
 STEEL MOUNTING CLIP ANGLE: 3"x3"x1/4"x6" LONG, THREE REQUIRED.
 WELD EACH CLIP ANGLE TO TANK BASE RING, TYPICAL.

EXPANSION TANK ANCHORAGE



- WEDGE ANCHOR TESTING NOTES:

 1. Test wedge anchors in hardrock or lightweight concrete to loads shown in table below.

 2. Apply proof lest loads to anchors without removing nut. If nut removal is required, remove nut and install threaded coupler to the same torque as the original nut using a torque wrench and apply the load.

 3. Reaction loads from test fixtures may be applied in close proximity to the anchor being tested provided the anchor is not restrained from withdrowing by the fixture(s).

 4. Test equipment is to be actilized by an approved testing laboratory in accordance with standard recognized procedures.

 5. Acceptance Criteria:

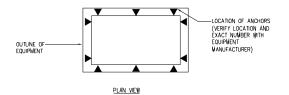
 a. Hydraulic Ram Method: The anchor should have no observable movement at the applicable test load. A practical method to determine observable movement is that the washer under the nut becomes loase.

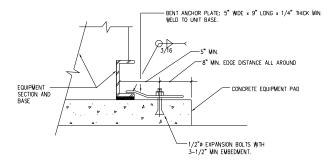
 b. Torque Wench Method: The applicable test torque shall be obtained within one half (1/2) turn

- in the percent is 1008e. b. Torque Wrench Method: The applicable test torque shall be obtained within one half (1/2) turn of the nut.
- Testing shall occur 24 hours minimum after installation of subject anchors.
- Testing shall be performed in the presence of the Inspector of Record (IOR).

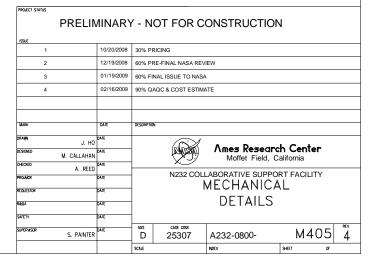
 Test 50 percent of installed anchors. If any anchor fails the test, test all anchors.

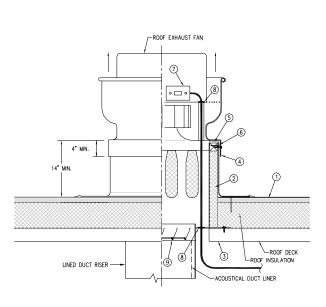
ANCHOR DIAMETER (Inches)	TEST LOAD (Lbs.)	TEST TORQUE (Ft-lbs.)	MIN. EMBEDMENT (Inches)
1/4" 3/8" 1/2" 5/8" 3/4"	800 1100 2000 2300 3700 5800	10 25 50 80 150 250	2" 2½" 3½" 4" 4¾" 6"











DETAIL NOTES:

1. MEMBRANE ROOFING. SEE ARCHITECTURAL DWSS FOR ROOF FLASHING AND ROOF SEALING REQUIREMENTS.

2. PREFABRICATED SOUND ATTENUATING ROOF CURB WITH RIGID INSULATION. SECURE BASE FLANGE TO ROOF DECK WITH SHEET WETAL SCREWS AT 8° ON CENTER, WINNIUM. THREE EACH SIDE.

3. REFER TO STRUCTURAL DWGS FOR FRAMING OF ROOF OPENING.

4. FAN CURB CAP. SECURE CURB CAP TO CURB WITH TWO #10 SHEET METAL SCREW EACH SIDE.

5. ½" THICK X 1½" WIDE PVC FOAM GASKET TAPE BETWEEN FAN CURB CAP AND CURB.

6. SECURE MEMBRANE FLASHING TO TOP OF CURB.

7. ELECTRIC SAFETY DISCONNECT SWITCH.

8. SEAL ELECTRIC SAFETY DISCONNECT SWITCH.

8. SEAL ELECTRIC POWER ENTRY WEATHERTIGHT WITH GROMMET.

9. BACKDRAFT DAMPER.

SCALE: NONE

ROOF EXHAUST FAN

R:\232\N232 Collaborative Supported 16, 2009 - 5:51:09 pm "XBDR-SHORT

- RED LIGHT/GREEN LIGHT CONTROL OPERATES FOR MANUAL WINDOWS AS FOLLOWS: GREEN: WINDOWS FULLY OPEN. GREEN & RED: WINDOWS ON MINIMUM SETTING. RED: WINDOWS CLOSED.
- BLACK BULBS THERMOSTATS UNDER NORMAL OPERATION CONTROL LOCAL CHILLED CEILING PANELS: AVERAGE READING USED FOR WINDOW CONTROL

<u>LEGEND</u>

- BB BLACK BULBS THERMOSTAT (MEASURES COMFORT TEMPERATURE)
- RG RED LIGHT/GREEN LIGHT (INDICATION SYSTEM)
- CO₂ CO₂ SENSOR

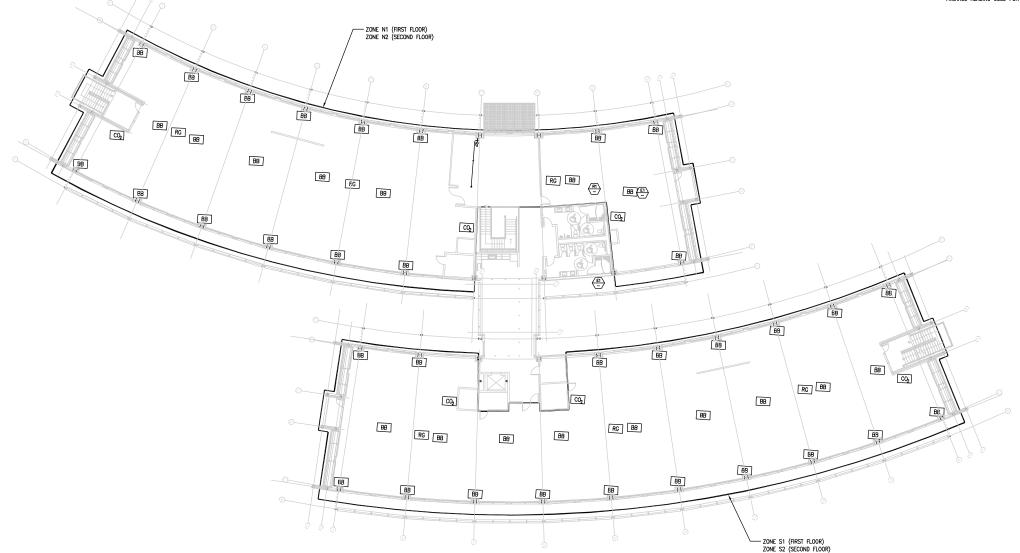
- RED_LIGHT/GREEN LIGHT_INDICATION SYSTEM

MOTORIZED TOP PANE -

WINDOW BLIND -

BLIND PARTIALLY -LOWERED POSITION

MANUAL LOUVER PANE — (MINIMUM & MAXIMUM SETTING) BLIND FULLY -LOWERED POSITION



WINDOW CONTROL STRATEGY (PER ZONE)

CONTROL STRATEGY	INSIDE TEMPERATURE F (AVERAGE IN ZONE)	OUTSIDE TEMPERATURE F	WINDOW SHUT	WINDOWS MIN. OPENING	WINDOWS FULLY OPEN (6")	MECHANICAL VENTILATION	HEATING	COOLING	LIGHT
1	LESS THAN 72	LESS THAN 63	Х			Х	Х		RED
2	LESS THAN 72	63-72		х			Х		R+G
3	72-77	72-77			Х				G
4	GREATER THAN 77	77-82		Х				Х	R+G
5	GREATER THAN 77	GREATER THAN 82	Х			Х		Х	RED

CO 2 OVERRIDE CONTROL

CO ₂ LEVEL	WINDOWS OPEN	WINDOWS SHUT
0-500 PPM	NO ACTION	MODULATE 0-50% TO NOT EXCEED 500 PPM
500-1000 PPM	RED LIGHT: CLOSE WINDOWS, FANS RUN 50-100% TO NOT EXCEED 1000 PPM	MODULATE 0-50% TO NOT EXCEED 500 PPM

1/16 = 1

PRELIMINARY - NOT FOR CONSTRUCTION 10/20/2008 30% PRICING 12/19/2008 60% PRE-FINAL NASA REVIEW 01/19/2009 60% FINAL ISSUE TO NASA 02/16/2009 90% QAQC & COST ESTIMATE Ames Research Center
Moffet Field, California V. DANG A. REED N232 COLLABORATIVE SUPPORT FACILITY MECHANICAL CONTROL DIAGRAMS: WINDOWS

D SZZ

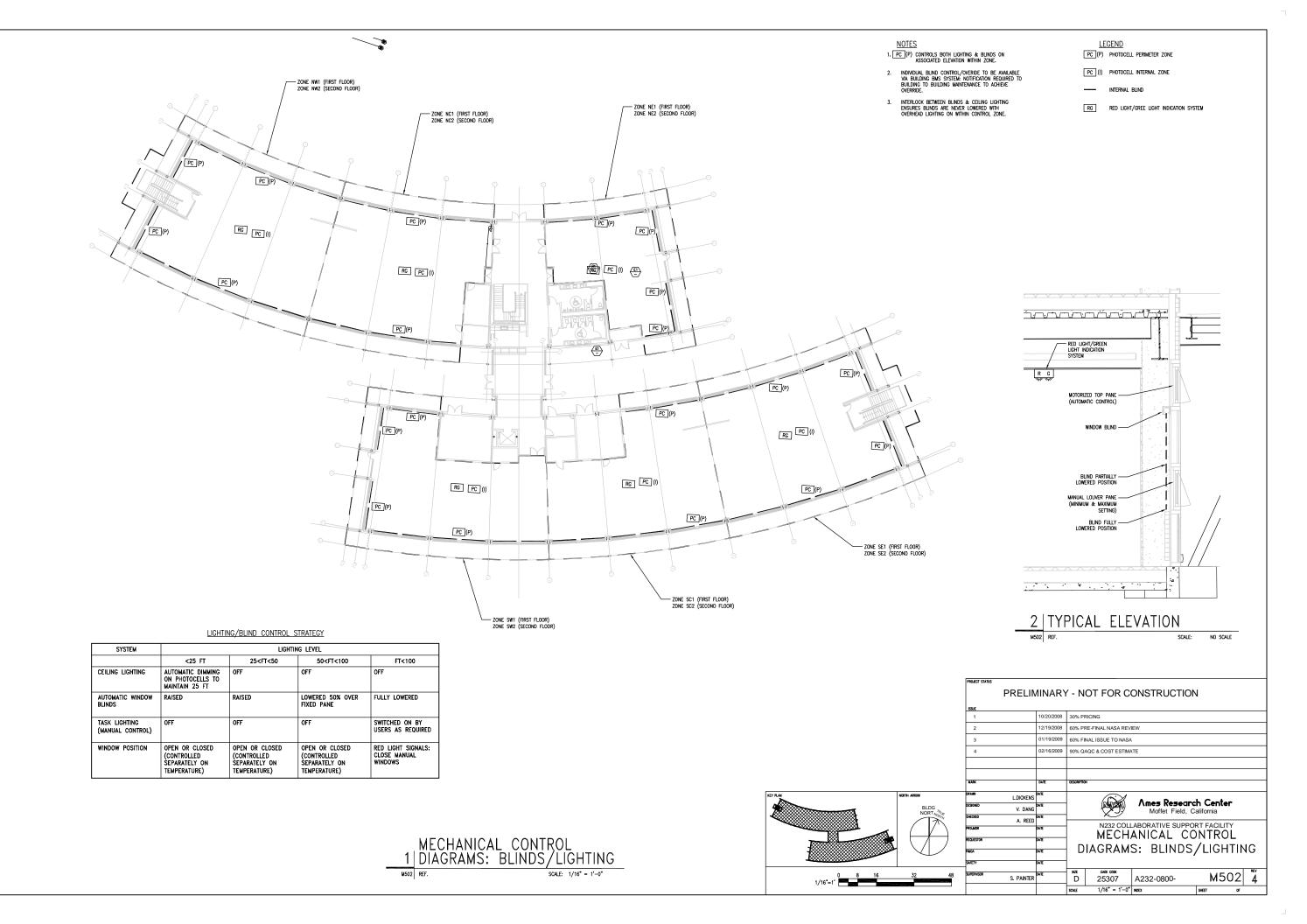
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1/16" = 1'-0" NDEX

M501 4

2 | TYPICAL ELEVATION

MECHANICAL CONTROL 1 DIAGRAMS: WINDOWS SCALE: 1/16" = 1'-0"



NOTES

EACH DOAS INCLUDES ENERGY RECOVERY UNIT. SEE ENERGY RECOVERY UNIT SCHEDULE FOR PERFORMANCE REQUIREMENTS.

VARIABLE FREQUENCY DRIVE (VFD): COMPATIBLE WITH SEMENS CONTROLS SYSTEM, FUSED DISCONNECT SWITCH, MANUAL BYPASS, NEMA 1 ENCLOSURE.

					ΕN	ER	GY	RE	CC)VEI	RY	U	NIT	(INT	EG	RAL	WITH DOA	(S)
MARK		WNTER	RENERGY	RECO	VERY					SUMMER	ENERG'	reco	VERY				OPER	UNIT DIMENSIONS (MAX)	REMARKS
	RELIEF	AIR		OS	A		RE	LIEF AI	R				OSA				WGT LBS	LENGTH x WIDTH x HEIGHT	
	CFM	EDB "F	CFM	EDB "F	LDB T	EFF	CFM	EDB "F	EWB F	CFM	EDB 1F	EWB 'F	LDB F	LWB 'F	LDP T	EFF			
(ERU)	3,000	69*	4,800	36.3°	53.6°	85%	3,000	77*	63.1*	4,800	85.3°	70.5*	80.9	69.2*	62.5°	85%	2	2	1) SENSIBLE RECOVERY ONLY
ERU 2	3,850	69*	4,800	36.3*	58.5°	85%	3,850	77*	63.1*	4,800	85.3*	70.5°	79.6	68.8*	62.5°	85%	2	2	1) SENSIBLE RECOVERY ONLY

NOTES

REFER TO DOAS SCHEDULE FOR PERFORMANCE DATA AND INFORMATION ABOUT ASSOCIATED DOAS AIR HANDLING UNIT.

WEIGHT IS INCLUDED WITH ASSOCIATED DOAS. SEE DOAS SCHEDULE FOR DIMENSIONS.

			AIF	R 01	JTLE	TS	A۱	ND I	NLETS
MARK	MFR & MODEL NO.	DESCRIPTION	NECK SIZE	CFM	MAX NECK FPM	MAX NC	APD *WG	DAMPER	REMARKS
S1 -	TITUS TAF-R	ACCESS FLOOR DIFFUSER (1)	8"ø	0-70	NA	10	0.05*	NONE	2346
E1	TITUS 50-F	EGGCRATE EXHAUST GRILLE	6	6	NA	20	0.06"	OBD	2345 1/2*x1/2*x1/2* ALUMINUM GRID
(R1)	TITUS 23-RL	SIDEWALL RELIEF GRILLE	6	6	NA	25	0.10"	OBD	2345
(S2) -	TITUS 271-FL	CEILING TRANSFER AIR GRILLE	14"x14"	6	NA	25	0.016"	NONE	②⑤ 1-WAY BLOW

 $\underbrace{ \text{NOTES} }_{\text{ACCESS FLOOR DIFFUSER:}} \text{ Vertical throw, high impact polymeric, removable curved slot, flow regulator.}$

MATCH FRAME TYPE, BORDER TYPE, AND PANEL SIZES WITH CEILING TYPE. COORDINATE WITH ARCHITECTURAL CEILING PLAN.

3 BRANCH DUCT SIZE IS SAME AS NECK SIZE, UON ON PLANS. PROVIDE DUCT TRANSITION WHERE NOTED DUCT SIZE DIFFERS FROM NECK SIZE. 4) ALL CEILING SUPPLY AIR OUTLETS HAVE 4-WAY BLOW PATTERN, UON.

5 PROVIDE STANDARD WHITE COLOR FOR FINISH SURFACES, UON ON ARCHTECTURAL PLANS. PROVIDE MATTE BLACK FINISH ON INTERIOR SURFACES.
6 SEE PLAN FOR CFM, NECK SIZE

							E	ΣXΗ	AUS	T F	ANS	6								
MARK	MFR &	SERVICE	LOCATION	TYPE	WHEEL	CFM	FSP	BHP	RPM	DRIVE	SONES	ov				MOTOR		OPER WGT	DIMENSIONS	REMARKS
	MODEL NO.						*WG					FPM	HP	WATT	RPM	VOLTAGE/PHASE/HZ	VFD	LBS	-	NEMANINO
TEF 1	GREENHECK CUBE-131-3	TOILET ROOMS & LUNCH ROOMS	ROOF NORTH WING	UP-BLAST	ВІ	1,540	0.50"	0.31	1330	BELT	14.3	-	1/3	-	1750	115 / 1ø / 60	NO	70	-	1
EF 1	GREENHECK LB-42-5	ATRIUM SOUTH LOBBY	ROOF SOUTH LOBBY	ROOF HOOD	ВІ	8,000	0.22"	0.50	260	BELT	5.7	-	1/2	-	1750	460 / 3ø / 60	YES	400	-	13
EF 2	GREENHECK TCB-2-24	MAIN ELECTRIC RM SOUTH WING	ROOF SOUTH WING	TUBULAR	ВІ	5,000	0.37"	0.88	570	BELT	10.9	-	1	-	1750	460 / 3ø / 60	YES	250	-	24
EF 3	GREENHECK CUBE-131-4	MER	ROOF SOUTH WING	UP-BLAST	ВІ	1,600	0.37"	0.30	1320	BELT	13.9	-	1/3	-	1750	115 / 1ø / 60	NO	70	-	1
(EF)	GREENHECK CUBE-141-3	ELECTRIC 110/120 NORTH WING	ROOF NORTH WING	UP-BLAST	ВІ	1,800	0.37"	0.29	1200	BELT	11.0	-	1/3	-	1750	115 / 1ø / 60	YES	90	-	1
EF 5	GREENHECK CUE-90-G	ELECTRIC 240	ROOF SOUTH WING	UP-BLAST	ВІ	350	0.25"	0.031	1300	DIRECT	4.6	ı	1/25	-	1300	115 / 1ø / 60	NO	40	-	1
EF 6	GREENHECK CUE-70-G	JANITOR/RECEIVING	ROOF SOUTH WING	UP-BLAST	ВІ	110	0.25"	0.009	1300	DIRECT	4,3	-	1/60	-	1300	115 / 1ø / 60	NO	30	-	1

PROVIDE ELECTRICAL SAFETY DISCONNECT SWITCH, BACKDRAFT DAMPER, AND ALUMINUM BIRD SCREEN

PROVIDE ELECTRICAL SAFETY DISCONNECT SWITCH, BACKDRAFT DAMPER, AND SPRING ISOLATION HANGERS

3 VARIABLE FREQUENCY DRIVE
4 PROVIDE TWO-SPEED MOTOR VARIABLE FREQUENCY DRIVE (VFD): COMPATIBLE WITH SEIMENS CONTROLS SYSTEM, FUSED DISCONNECT SWITCH, MANUAL BYPASS, NEMA 1 ENCLOSURE.

		Н	OT	WAT	ER	RAE	DIAN	IT HI	EATI	NG PAN	NELS	
MARK	MFR & MODEL NO.	SERVICE	TUBES	GPM	WPD 'WG	EWT *F	PIPE SIZE	OUTPUT BTUH/LF	RATED PSI	DIMENSIONS HEIGHT x DEPTH	WET WEIGHT LBS/LF	REMARKS
(H)	RUNTAL RF-4	PERIMETER HEATING	4	0.20	0.10'	120*	1/2"	1,360	120°	11.5" x 1.6"	8.0	12
$\begin{pmatrix} H \\ 2 \end{pmatrix}$	RUNTAL RF-5	PERIMETER HEATING	5	0.20	0.10'	120*	1/2*	1,720	120*	14.4" x 1.6"	11.0	①
$\frac{H}{3}$	RUNTAL RF-6	PERIMETER HEATING	6	0.20	0.10'	120*	1/2"	1,990	120*	17.3" x 1.6"	13.0	①
(H) 4	RUNTAL RF-7	PERIMETER HEATING	7	0.20	0.10'	120*	1/2"	2,150	120°	20.2" x 1.6"	15.2	①
(H) 5	RUNTAL RF-8	PERIMETER HEATING	8	0.20	0.10'	120*	1/2"	2,390	120°	23.1" x 1.6"	18.1	①
$\begin{pmatrix} H \\ 6 \end{pmatrix}$	RUNTAL RF-9	PERIMETER HEATING	9	0.20	0.10'	120*	1/2"	2,530	120°	26.0" x 1.6"	19.4	①

OJECT STATUS		,	07.500.00		
PRELIN	MINARY	′ - N	OT FOR CO	ONSTRUCTION	l
SUE					
1	10/20/2008	30% P	RICING		
2	12/19/2008	60% P	RE-FINAL NASA REVI	EW	
3	01/19/2009	60% F	INAL ISSUE TO NASA		
4	02/16/2009	90% Q	AQC & COST ESTIMA	TE	
ARK	DATE	DESCRIPTIO	ON .		
J. HO	DATE			Ames Researc	h Conton
M. CALLAHAN	DATE		(ANATSA)	Moffet Field, C	
A. REED	DATE	_	NICO COLL	ABORATIVE SUPPO	DT FACILITY
AMGR	DATE			MECHANICA	
UESTOR	DATE		•		
DV	DATE		EQUIP	MENT SCH	FDOFF2
ETY	DATE				
PERVISOR S. PAINTER	DATE	SZE D	25307	A232-0800-	M601 4 4 1
	1				

RATED COOLING EER SHALL BE CERTIFIED PER ARI/ASHRAE/ISO 13256-2 AT FULL LOAD (LOAD EWT=53.6T, SOURCE EWT=77.0T)

2 RATED HEATING COP SHALL BE CERTIFIED PER ARI/ASHRAE/ISO 13256-2 AT FULL LOAD (LDAD EWT=104F, SOURCE EWT=32.0F)

3 PROVIDE FACTORY ACOUSTICAL ATTENUATION KIT TO REDUCE THE A-WEIGHTED SOUND PRESSURE LEVEL TO XX dbA MAX. PER ARI STANDARD 575 94.

4 FACTORY INSTALLED CONTROL MODULE, FULL THERMAL INSULATION, REFRIGERANT ISOLATION VALVE AND LIQUID BALL VALVE

																				AIR C	COND	ITIO	NINC	3 UI	NITS												
MARK	MFR & MODEL NO.	SERVICE	TYPE	SI	PPLY FANS	(BLOWERS	()			DX COC	DLING COIL	(MAX FV	=450 FPI	w)		FILTERS	HUMIDII	TER	REHEAT		UNIT ELEC	TRICAL PO	WER	UNIT	T DIMENSIONS	UNIT WEIGHT					R	EMOTE C	ondenser (OUTDOOR)			REMARKS
	MODEL NO.			CFM	OSA ES	FANS	MHP	EDB *F	EWB F	LDB F	AMB TO	CC RO	WS RL 00	HG OD	RS CD OD	NO./ SIZE	KW LB/HF	DCW	TYPE	(W VOLTS/	/PHASE	FLA N	MOC MOC	ΣP L	хихп	LBS	CFM	FANS	MHP	VOLTS/PHASE	FLA	MCA	моср	DIMENSIONS L" x W" x H"	WEIGHT LBS	MFR & MODEL NO.	
DAC 1	CARRIER 40MVC009 OR EQUAL	ELEVATOR MACHINE ROOM	DUCTLESS WALL MOUNT	325	NOME N	ONE	0.03	90.	62*	58*	95" 11	1.6	2 14"	_	¾ " 0.65"	-	NONE -	-	NONE	- 115V	/ 10	9.2	12 20	33*	" x 8" x 12"	18	1000	ONE	0.102	115V / 1ø	-	-	-	31" x 12" x 22"	70.4	CARRIER 38MVC009 OR EQUAL	12
DAC 2	CARRIER 40MVC009 OR EQUAL	COMM 108	DUCTLESS WALL MOUNT	325	NONE NA	ONE	0.03	90.	62*	58*	95* 11	1.6	2 14"	-	¾ " 0.65″	-	NONE -	-	NONE	- 115V	/ 10	9.2	12 20	33*	" x 8" x 12"	18	1000	ONE	0.102	115V / 1ø	-	-	-	31° x 12° x 22°	70.4	CARRIER 38MVC009 OR EQUAL	12
DAC 3	CARRIER 40MVC009 OR EQUAL	TEL/DATA 113	DUCTLESS WALL MOUNT	325	NONE NA	ONE	0.03	90.	62*	58*	95* 11	1.6	2 14"	-	¾ " 0.65"	-	NONE -	-	NONE	- 115V	/ 10	9.2	12 20	33*	* x 8" x 12"	18	1000	ONE	0.102	115V / 1ø	-	-	-	31" x 12" x 22"	70.4	CARRIER 38MVC009 OR EQUAL	12
DAC 4	CARRIER 40MVC009 OR EQUAL	TEL/DATA 213	DUCTLESS WALL MOUNT	325	NONE NA	ONE	0.03	90.	62*	58°	95* 11	1.6	2 14"	-	¾ " 0.65″	=	NONE -	-	NONE	- 115V	/ 10	9.2	12 20	33*	" x 8" x 12"	18	1000	ONE	0.102	115V / 1ø	-	-	-	31" x 12" x 22"	70.4	CARRIER 38MVC009 OR EQUAL	1)2

NOTES:

1 TOTAL UNIT POWER REQUIREMENTS ARE LIST UNDER INDOOR UNIT FOR UNIT.

2) DUCTLESS INDOOR UNITS ARE LOCATED IN ROOM SERVED. OUTDOOR UNITS ARE LOCATED ON ROOF INSIDE ARCHITECTURAL FENCE.

1										F	PU	MPS	S							
	MARK	MFR &: MODEL NO.	LOCATION	SERVICE	TYPE	GPM	TDH 'WG	MAX NPSHR		FLUID SG	RATED F	RATED PSIG	INLETxOUTLET SIZE	BHP	HP	RPM	MOTOR VOLTAGE/PHASE/HZ	VFD	OPER WGT	REMARKS
ŀ	GWP GWP 2	B&G SERIES 80 2-1/2x2-1/2x7	MER	GEOTHERMAL WATER	IN-LINE	120	150'	'WG	50°	1.0	225*	175	2½" x 2½"	7.7	15	3,500	460 / 3ø / 60	YES	LBS 460	12
	CHP CHP 2	B&G SERIES 80 2-1/2x2-1/2x7	MER	CHILLED WATER (60°F)	IN-LINE	190	110'	10.6'	50*	1.0	225'	175	2½" × 2½"	8.2	10	3,500	460 / 3ø / 60	YES	370	12
	CHP 3 CHP 4	B&G SERIES 90 1-1/4 AA	MER	CHILLED WATER (451F)	IN-LINE	30	90'	8.2"	45	1.0	225*	175	1¼" × 1¼"	1.7	3	3,450	460 / 3ø / 60	YES	65	12
	HWP HWP 2	B&G SERIES 60 2x6-1/4	MER	HEATING WATER	IN-LINE	45	30*	6.7*	110	1.0	225*	175	2* x 2*	0.57	1	1,750	460 / 3ø / 60	YES	90	12
	HPP HPP 2	B&G SERIES 60 2x5-1/4	MER	HEAT PUMP PRIMARY	IN-LINE	90	20'	6.3'	110*	1.0	225*	175	2" x 2"	0.68	1	1,750	460 / 3ø / 60	NO	80	1
	HPP 4	B&G SERIES 60 2x5-1/4	MER	HEAT PUMP PRIMARY	IN-LINE	90	20'	6.3'	50°-	1.0	225*	175	2" x 2"	0.68	1	1,750	460 / 3ø / 60	NO	80	1
	HPP 5	B&G SERIES 60 2x5-1/4	MER	HEAT PUMP TRANSFER	IN-LINE	90	20*	6.3*	50°	1.0	225*	175	2" x 2"	0.68	1	1,750	460 / 3ø / 60	NO	80	①
	(CP) (CP) 2	B&G BOOSTER PL-30	MEN 105	NORTH LOBBY SLAB	IN-LINE	1.2	20*	-	110	1.0	225*	175	1½" × 1½"	-	0.08	2,650	115 / 1ø / 60	YES	15	123
	(OP) 3	B&G BOOSTER PL-55	MER	SOUTH LOBBY	IN-LINE	1.2	50'	-	110"	1.0	225*	175	1½" × 1½"	-	0.4	3,250	115 / 1# / 60	YES	15	123

1) ACCEPTABLE PUMP MANUFACTURERS: BELL & GOSSETT, PACO, TACO, OR APPROVED EQUAL.

(2) VARIABLE FREQUENCY DRIVE (VFD): COMPATIBLE WITH SEIMENS CONTROLS SYSTEM, FUSED DISCONNECT SWITCH, MANUAL BYPASS, NEMA 1 ENCLOSURE.

(3) FACTORY MOUNTED VFD ON UNIT

							6	EXP	ANSION	I TA	NKS
MARK	MFR & MODEL NO.	LOCATION	SERVICE	TYPE	MIN OPER PSIG	MAX OPER PSIG	MIN ACCEPTANCE GAL	MIN TANK GAL	DIMENSIONS DIA x HEIGHT	OPER WGT LBS	REMARKS
ET 1	B&G	MER	HEATING WATER	BLADDER	30	125	-	-	-	-	•
ET 2	B&G	MER	CHILLED WATER	BLADDER	30	125	-	-	-	1	•
ET 2	B&G	MER	GROUND WATER	BLADDER	30	125	-	-	-	-	①

PROVIDE AIR SEPARATOR.

PROJECT STATUS PRELIN	MINARY	/ - N	IOT FOR C	ONSTRUCTION	N	
1	10/20/2008	30% P	RICING			
2	12/19/2008	60% P	RE-FINAL NASA REV	IEW		
3	01/19/2009	60% F	INAL ISSUE TO NASA			
4	02/16/2009	90% C	AQC & COST ESTIMA	ATE		
MARK	DATE	DESCRIPTI	ON .			
DRAWN J. HO	DATE		DIRECTOR	Ames Researc	h Center	
M. CALLAHAN	DATE			Moffet Field, C		
A. REED	DATE			ABORATIVE SUPPO		
REQUESTOR	DATE			MENT SCH	-	
R&QA SAFETY	DATE		LQUIII	WILITI JOH	LDOLLS	
supervisor S. PAINTER	DATE	SIZE D	25307	A232-0800-	M602	REV 4
		SCALE	•	NDEX	SHEET OF	

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